IDAHO
DEPARTMENT OF FISH AND GAME

FEDERAL AID IN FISH RESTORATION
1995 Job Performance Report
Program F-71-R-20

REGIONAL FISHERIES MANAGEMENT INVESTIGATIONS
PANHANDLE REGION (Subprojects I-A,II-A, III-A, IV-A)

PROJECT I.	SURVEYS AND INVENTORIES
Job a.	Panhandle Region Mountain Lakes Investigations
Job b.	Panhandle Region Lowland Lakes Investigations
Job c.	Panhandle Region Rivers and Streams Investigations
PROJECT II.	TECHNICAL GUIDANCE
PROJECT III.	HABITAT MANAGEMENT
PROJECT IV.	POPULATION MANAGEMENT

BY

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IDFG 99-22

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1995 ANNUAL PERFORMANCE REPORT

State of: Idaho

Program: Fisheries Management F-71-R-20

Project I: Surveys and Inventories

Subproject I-A: Panhandle Region

Job: a

Title: Mountain Lakes Investigations

Contract Period: July 1, 1995 to June 3,. 1996

ABSTRACT

Bull trout *Salvelinus confluentus* stocked into Revett and Upper Glidden lakes grew a minimum of 136 mm since August 1993. Brook trout S. *fontinalis* condition factors have improved since the introduction of bull trout. In Revett Lake, the condition factor increased from 0.45 to 0.88. In Glidden Lake, the condition factor for brook trout less than 180 mm decreased from 0.98 to 0.88. However, the condition factor for brook trout greater than 180 mm increased from 0.74 to 0.88.

Hatchery stocking evaluations were made on Hunt Lake and Parker Lake. Three age classes of cutthroat trout *Oncorhynchus clarki,* age 2+ to 4+, were sampled in Hunt Lake. The average condition factor for cutthroat trout in Hunt Lake was 0.82 with a size range of 162 mm to 250 mm. Arctic grayling *Thymallus arcticus* sampled in Parker Lake ranged in length from 160 mm to 220 mm and had an average condition factor of 0.85.

Swede Lake was surveyed to determine its suitability for fish stocking. Anglers fishing mountain lakes reported information from four mountain lakes in the Panhandle Region in 1995; Standard, Harrison, Mollies, and Snow lakes. Standard Lake yielded one westslope cutthroat trout *O. clarki lewisi* in 1 h of angler effort. Catch rates were 3.3 cutthroat/h in Harrison Lake, 4 cutthroat/h in Mollies Lake, and 3.8 cutthroat/h in Snow Lake.

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OBJECTIVES

1. Evaluate bull trout *Salvelinus confluentus* stocking in mountain lakes to control stunted brook trout *S. fontinalis* populations.

2. Evaluate stocking rate and stocking frequency of mountain lakes in relation to observed angler use, catch rates, growth rates, and fish abundance as determined by gillnetting.

3. Establish limnological and water chemistry baselines to determine potential productivity and to determine future changes.

INTRODUCTION

In 1993, four mountain lakes, Upper Glidden, Revett, Roman Nose # 1 and # 2, were stocked with bull trout to control stunted brook trout populations and improve the quality of the brook trout fishery (Horner et al. 1997). Stocking densities ranged between 40 fish/ha and 70 fish/ha. Upper Glidden and Revett lakes were revisited in 1995 to determine if a change in brook trout condition factors had occurred since introduction of bull trout (Figure 1).

Hunt and Parker lakes were surveyed in 1995 to evaluate hatchery stocking success. Hunt Lake is stocked annually with westslope cutthroat trout *Oncorhynchus clarki lewisi* at a rate of 101 fry/ha (Appendices A, B, and C of the Population Management section of this report.). Parker Lake stocking requests are for golden trout *O. aguabonita* or Arctic grayling *Thymallus arcticus* as an alternative. No golden trout have been available since 1990, and grayling were last stocked in 1993.

Swede Lake, also known as Colburn Lake, is located on land managed by Schweitzer Mountain Ski Resort. A request was made by Schweitzer Mountain Ski Resort in 1995 to stock Swede Lake to provide angling opportunity to summer hikers. Swede Lake was surveyed to determine if it could support fish, and if so, how many. Angler reports were received for five other mountain lakes in the Panhandle Region in 1995; Snow, Mollies, Standard, Harrison, and Forage lakes.

METHODS

The Idaho Department of Fish and Game (IDFG) standard mountain lake survey procedure was used to survey Upper Glidden, Revett, Hunt, and Parker lakes. A bathymetric map of Swede Lake was made using a portable depth finder fitted to a two-man rubber raft. Predetermined timed transects were run across Swede Lake recording depths through the transect. Other physical and chemical evaluations were made utilizing techniques from the standard mountain lake survey procedure. Volunteer surveys of mountain lakes consist of visual observations of camp sites/fire rings, inlets and outlets, and hook-and-line sampling of the fishery. In some cases, anglers filled out a Volunteer Mountain Lake Survey form that includes categories for all these parameters; in others reports, only verbal or brief written information was obtained about catch rates and/or size of fish captured in the mountain lakes.

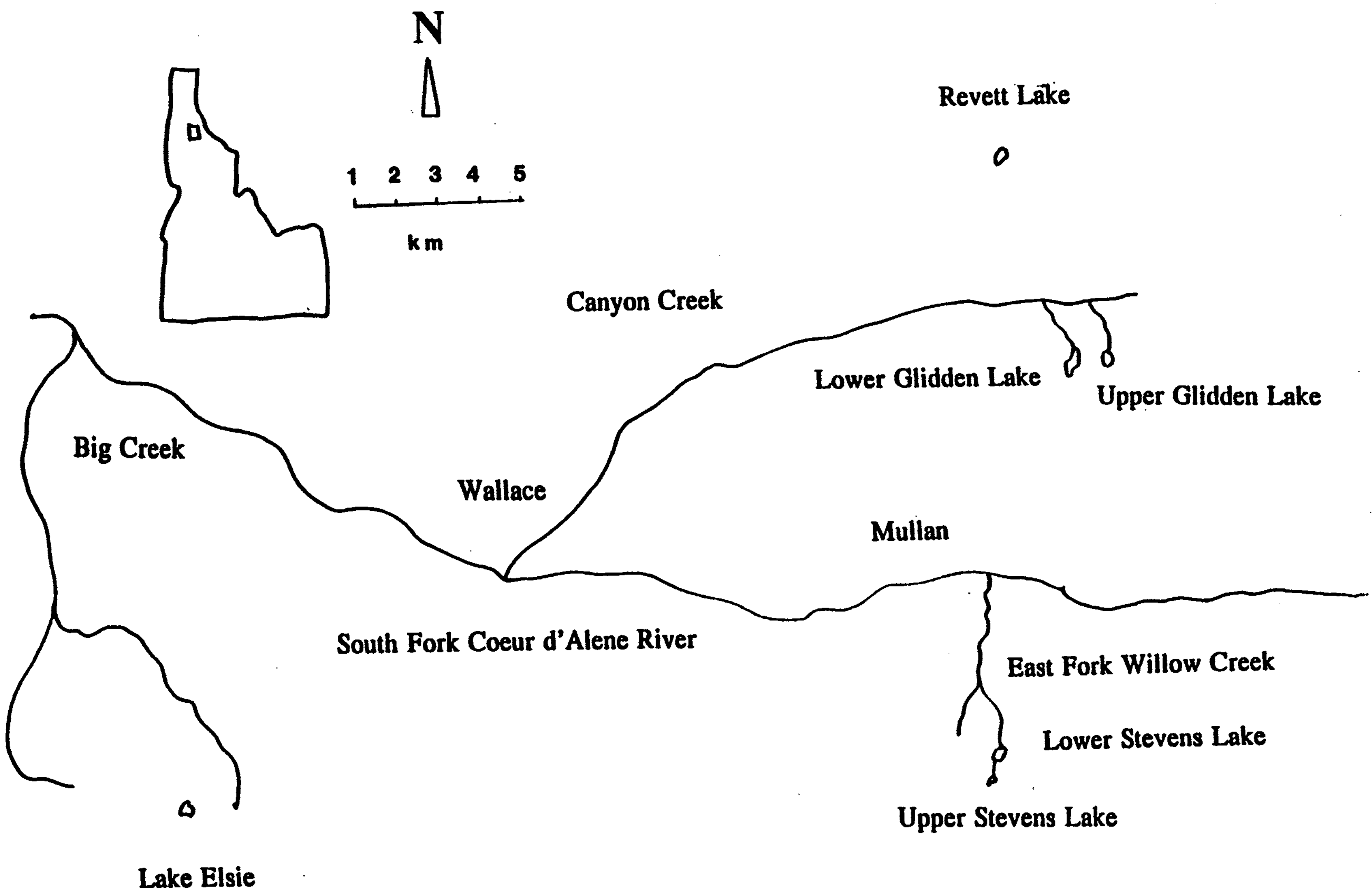


Figure 1. Location of Revett and Upper Glidden lakes, Idaho.

RESULTS AND DISCUSSION

The density of bull trout stocked into Upper Glidden Lake was 40 fish/ha or 180 fish stocked. These fish ranged from 200 mm to 350 mm in length when stocked in 1993. Two bull trout were collected in the 1995 sampling effort. They were 497 mm and 486 mm in length when captured. A 195 mm brook trout was found in the stomach of the 486 mm bull trout. The bull trout grew a minimum of 136 mm since August 1993.

In Upper Glidden Lake, the condition factors in 1993 and 1995 for brook trout less than 180 mm were 0.98 and 0.88, respectively (Table 1). Condition factors for brook trout greater than 180 mm were higher in 1995 than in 1993, 0.88 and 0.74, respectively. The length-weight equation for Upper Glidden Lake in 1995 was similar to those reported by Carlander (1969) for normal populations of brook trout.

The density of bull trout stocked into Revett Lake was 70 fish/ha or 315 fish. No bull trout were collected from Revett Lake. Condition factors or length-weight relationships of brook trout from Revett Lake were greater in 1995 than in 1993, 0.88 and 0.45, respectively (Table 1). The length-weight equation for Revett Lake in 1995 was similar to those reported by Carlander (1969) for normal populations of brook trout.

Stocking bull trout as a predator to control stunted brook trout populations appears to work in Revett Lake, which had the highest bull trout stocking rate, 70 fish/ha. It was unclear whether the stocking of bull trout in Upper Glidden Lake at 40 fish/ha was successful. There was an increase in condition for brook trout greater than 180 mm in length, but not for brook trout less than 180 mm in length. Evaluation of stocking rates of 50 and 60 fish/ha in Roman Nose lakes 1 and 2 may help determine which stocking rate is best.

The most critical factor is the size of the predator. The predator must be large enough to exploit most of the stunted prey population as forage. It should be noted that the use of bull trout as a control predator was a one time experiment utilizing hatchery reared bull trout. Any use of bull trout in the future as a brook trout control cannot be expected.

Twenty-four westslope cutthroat trout were sampled with two overnight gill net sets in Hunt Lake, Bonner County, August 13, 1995 (Appendix A). The average length of fish sampled was 219 mm with an average condition factor (K) of 0.82. Age analysis of otoliths taken from these fish showed three age classes. Age 2+ fish range from 160 mm to 190 mm in length, age 3+ fish ranged from 200 mm to 230 mm, and age 4+ fish ranged from 210 mm to 250 mm. Stocking strategy for Hunt Lake, since 1985, has been an annual fry plant of 101 westslope cutthroat trout/ha. This strategy is providing a good abundance of cutthroat trout for Hunt Lake. Growth rates of fish in Hunt Lake are not affected by overstocking. Angler access to Hunt Lake is classed as "poor," because most of the ~1.6 km trail is through a boulder field. Hunt Lake has one major inlet and an outlet. No evidence of natural reproduction was seen in either the inlet or outlet of Hunt Lake. The fishery is dependant on hatchery supplementation. Water chemistry and physical attributes of Hunt Lake are presented in Table 2.

Table 1. Length-weight equations for brook trout before and after the stocking of bull trout in Upper Glidden and Revett lakes, Idaho, 1995.

Lake	Year	Coefficient of condition K (TL)		Length-weight equation
Upper Glidden	1993	<180 mm	0.98	Log W = 2.1698+1.7129 Log L
		>180 mm	0.74	
	1995	<180 mm	0.88	Log W = -5.0346+2.99 Log L
		>180 mm	0.88	
Revett	1993	0.45		Log W = -7.8577+4.0907 Log L
	1995	0.88		Log W = -4.6077+2.806 Log L

Table 2. Chemical and physical parameters of the waters of three north Idaho mountain lakes.

Lake	Sample date	Alkalinity mg/l	Conductance umho/cm^2 @ 25°C	pH	Surface Temperature
Hunt	08/13/95	20	8	6.58	7.0 C
Parker	07/02/95	5	9	6.5	10.0 C
Swede	08/24/95	40	12	7.65	14.0 C

Parker Lake, Kootenai River drainage, historically received a biennial stocking of cutthroat trout fry. The last stocking of westslope cutthroat trout occurred in 1976. In 1979, stocking of Parker Lake was switched over to golden trout only when available, or Arctic grayling as an alternate species. During the past 15 years, golden trout have only been stocked three times and Arctic grayling four (Appendix A of the Population Management section). Stocking rates for golden trout and Arctic grayling have been based on the total number of fry available for the Panhandle Region and not a set number/ha/lake. Parker Lake was surveyed July 2, 1995 (Appendix A). Water chemistry and physical attributes of Parker Lake are given in Table 2. One overnight gill net set and 1 h of hook-and-line angling effort (Table 3) yielded a catch of 15 Arctic grayling (gill net catch = 3, hook-and-line = 12) on July 2, 1995. The mean length of Arctic grayling sampled was 180 mm, the length range was 160 mm to 220 mm. The average K of Arctic grayling in Parker Lake was 0.85. Age analysis of scale samples taken from Parker Lake grayling show all fish in the sample to be two years of age. The two ephemeral inlets and the outlet of Parker Lake provide only fair to poor spawning habitat considered inadequate for successful spawning. Angler use in the area appears light, as evidenced by the condition of the three unimproved campsites and moderate amounts of litter.

Swede Lake is a 1.2 ha cirque lake at the head of the south fork of Colburn Creek in Bonner County, Idaho (R2W, T58N, S17). Swede Lake was surveyed August 24, 1995 (Appendix A). Maximum depth is 4.3 m with a mean depth of 2.1 m. Total estimated volume is 20.72 acre-feet (Table 2, Figure 2). Presently barren of any fish life, Swede Lake does offer the potential to support a limited annual or biennial stocking of westslope cutthroat trout fry. The frequency of the stocking would depend upon the angler use and harvest rate of the cutthroat trout. An initial stocking rate of 101 fry/ha, as with other mountain lakes in north Idaho, is recommended.

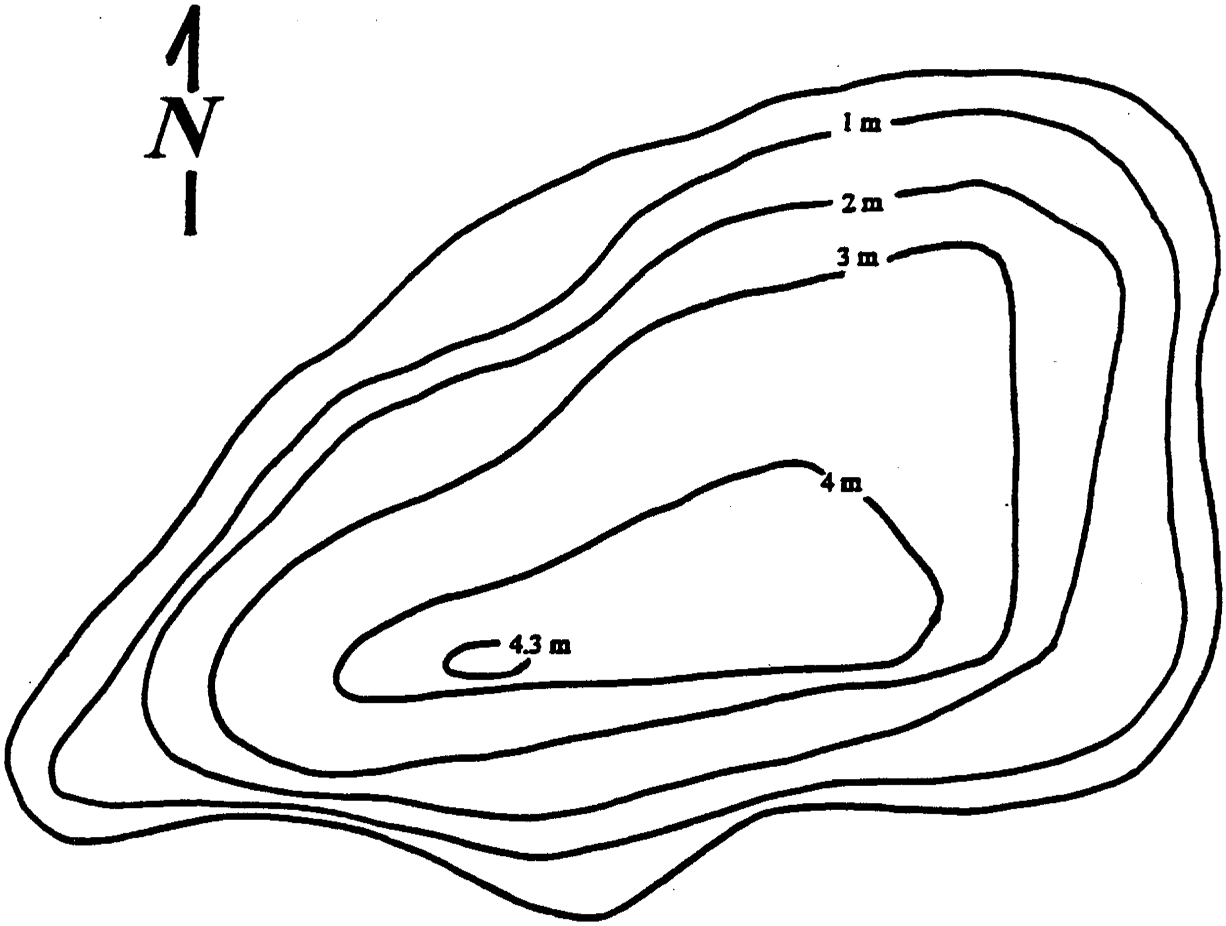
Relatively few standard mountain lake surveys are conducted in the Panhandle Region due to higher priority needs. Reports from anglers fishing mountain lakes provides useful information on stocking rates and the performance of different species of fish stocked. Table 3 summarizes angler catch data from Panhandle Region mountain lakes in 1995. From all indications, the existing mountain lake management program is providing good catch rates for acceptable size fish.

Fisheries for specialty fish like golden trout and Arctic grayling are in high demand, but the supply of these fish has been limited and inconsistent. Golden trout were last stocked into Parker and Forage lakes in 1990, and an angler catch of two golden trout (380 mm and 430 mm) in Forage Lake indicates a few fish have persisted. However, without more frequent stocking, the two golden trout lakes in the region will soon be lost. The supply of Arctic grayling has been more consistent and several grayling fisheries exist in the region, although the fish are not large. Stocking history for mountain lakes in the region is given in Appendix A of the Population Management section.

Winter kill conditions were reported as a problem in Mollies Lake, Priest Lake drainage, in the past. In 1995, angler observations/success at Mollies Lakes shows that the hatchery stocked westslope cutthroat trout have survived, are growing at expected rates and are providing a typical catch rate for mountain lakes.

Table 3. Angler catch and effort from six mountain lakes in the Panhandle Region of Idaho in 1995.

Lake	Species	Number caught	Length range (mm)	Effort (h)
Parker Lake	Arctic grayling	11	160 - 220	1.0
Forage Lake	Arctic grayling	1	343	--
	golden trout	2	380 - 430	--
Mollies Lake	cutthroat trout	2	200 -249	0.5
Standard Lake	cutthroat trout	1	150 - 199	1.0
Harrison Lake	cutthroat trout	10	50 - 99	3.0
Snow Lake	cutthroat trout	15	150 - 299	4.0



Survey date August 24, 1995

depth	temp (°C)	D.O.
surface	14.0	8.2
1m	13.5	8.2
2m	13.1	8.0
3m	12.9	7.9
4m	12.9	7.9

location=NW 1/4S17T58NR2W
N48°22'57"-W116°37'30"
elevation=1,646
surface area=1.2 ha
mean depth=2.1 m
max depth=4.3 m
volume=20.72 acre-feet
secchi=4.3+m
pH=7.65
alkalinity=40 mg/1
conductivity=12 umhos
T.D.S.=10 mg/1

Figure 2. Map of Swede Lake (Colburn Lake), Bonner County, Idaho, with depth contours and other physical and chemical parameters.

RECOMMENDATIONS

1. Survey Roman Nose lakes #2 and #3 in 1996 to evaluate the bull trout stocking rates and the impact bull trout have had on brook trout in these two systems as compared with the Upper Glidden and Revett lakes stocking rates.

2. Continue with the stocking frequency and rate of 101 fry/ha/year in Hunt Lake and survey additional mountain lakes in 1996 to evaluate similar stocking rates and every other year stocking strategies.

3. Continue with the stocking strategy of golden trout/Arctic grayling in Parker Lake whenever these fish are available.

4. Stock Swede Lake with 132 westslope cutthroat trout fry (101/ha) in 1996 and evaluate that stocking in 1998 before any additional stocking.

5. Continue with the current stocking strategy for Snow and Mollies lakes.

LITERATURE CITED

Carlander, K.D. 1969. Handbook of freshwater fishery biology. Vol 1. Iowa State University Press, Ames.

Horner, N.J., J.A. Davis, and V.L. Nelson. 1997. Regional management investigations. Idaho Department of Fish and Game. Federal aid in fish restoration. Project F-71-R-18, Boise.

APPENDIX

Appendix A. Mountain Lakes Standard Survey forms and Mountain Lakes Volunteer Survey forms for seven Panhandle Region mountain lakes surveyed in 1995.

Idaho Fish and Game
Mountain Lake Survey Form

LAKE NAME: Hunt **DATE:** 08 / 13 / 95

IDFG Catalog #: _ _:_ _:_ _ _ _:_ _ _ _ **EPA #:** ______

Major Drainage Priest Lake **Minor Drainage:** Hunt Creek
County: Bonner **Region:** Panhandle
USFS Ranger Dist: ______ **Wilderness Area:** IPNF
Section: 3 **Township:** 60N **Range:** 3W **Elevation:** 5,600 **feet**
GPS (lat/long) ______

PHYSICAL:

Lake Type: 1 **1. cirque 2. moraine 3. slump 4. caldera 5. beaver**
Total Surface Area: 4 . 9 **Hectares**
Depth profile: 1
1. deep (75%) of lake >6m deep)
2. moderate (50%) of lake >6m deep)
3. shallow (25%) of lake >6m deep)

Maximum Depth 10 **meters**
Average Depth ______ **meters**

Aspect: 1
1. Lake has north facing exposure
2. Lake has south facing exposure
3. Lake has east facing exposure
4. Lake has west facing exposure
5. Lake is exposed in all directions

CHEMICAL

Alkalinity 20 **mg/1**
Conductance 8 **umho/cm^2 @ 25C**
Secchi Depth -- **meters**

pH 6.58
Temp (surface) 7.0 **C**
Temp (bottom) --. **C**

SPAWNING POTENTIAL

Inlet(s) 1 **(number)**
Length accessible for spawning 0 **meters**
Inlet spawning suitability: 4

Outlet(s) 1 **(number)**
Length accessible for spawning 0 **meters**
Outlet spawning suitability: 4

1. excellent (abundant)
2. adequate (enough to maintain suitable spawning population)
3. fair (not adequate to maintain population)
4. poor (not suitable for successful spawning)

USE

Campsites 4 **(number)** **Fire pits** 4 **(number)** **Litter** L M H
Trail around lake: ______ **complete** ______ **partial, trampled: YES NO**
Access: ______ **good trail** X **poor trail** ______ **cross country** (across boulder f

BIOLOGICAL

Zooplankton Composition and Density

Genera Identified	% of sample	Size	Density (o/1)

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Hunt Lake

INSECT COMPOSITION AND ABUNDANCE

Aquatic Genera	Relative abundance			Terrestrial Genera	Relative abundance		
	L	M	H		L	M	H
	L	M	H		L	M	H
	L	M	H		L	M	H
	L	M	H		L	M	H

FISH SURVEY

Fishermen _______ **(numbers)** **Hours fished** _______ **(total)**
Fish caught _______ **Fish/hour** _______ **Abundance** L M H

2-1 sinking & 1 floating

LENGTH FREQUENCY (Collection Method: ____ angling: ___ x gill net\net hrs 21)

Species	0-49	50-99	100-149	150-199	200-249	250-299	300-349	350-399	400+
					Total Length in mm				
CTT	0	0	0	4	20	1	0	0	0
Total				4	20	1			

FISH CONDITION

	Total Length (mm)		Weight (g)		Condition (K)	
Species	mean	range	mean	range	mean	range
CTT	219	162-250	89	34-130	0.82	0.70 to 0.95

STOCKING HISTORY

Year	Species	Number of Fish	Comments

COMMENTS:

Idaho Fish and Game
Mountain Lake Survey Form

LAKE NAME: Parker **DATE:** 07 / 02 /95

IDFG Catalog #:_ _:_ _:_ _ _ _:_ _ _ _ **EPA #:** ______

Major Drainage Kootenai **Minor Drainage:** Canyon Creek
County: Boundary **Region:** 1
USFS Ranger Dist: Bonners Ferry **Wilderness Area:** ______
Section: 28 **Township:** 64N **Range:** 2W **Elevation:** ______ **feet**
GPS (lat/long) ______

PHYSICAL:

Lake Type: 1 **1. cirque 2. moraine 3. slump 4. caldera 5. beaver**
Total Surface Area: 1 . 2 **Hectares**
Depth profile: ______ **Aspect:** 1

1. deep	**(75%) of lake >6m deep)**	**1. Lake has north facing exposure**
2. moderate	**(50%) of lake >6m deep)**	**2. Lake has south facing exposure**
3. shallow	**(25%) of lake >6m deep)**	**3. Lake has east facing exposure**
Maximum Depth ______ **meters**		**4. Lake has west facing exposure**
Average Depth ______ **meters**		**5. Lake is exposed in all directions**

CHEMICAL

Low range alkalinity - 5 mg/1

High range **Alkalinity** 20 **mg/1** cal O_3 **pH** 6.5
Conductance 9 **umho/cm^2 @ 25C** **Temp (surface)** 10 .___ **C**
Secchi Depth ______ **meters** **Temp (bottom)** ______.___ **C**
DO 9 mg/L TDS 10
Hardness 20 mg/1 cal O_3

SPAWNING POTENTIAL

Inlet(s) 2-3 **(number)** **Outlet(s)** 1 **(number)**
Length accessible for spawning 0 **meters** **Length accessible for spawning** 30-40 **meters**
Inlet spawning suitability: 4 **Outlet spawning suitability:** 3

1. **excellent** (abundant)
2. **adequate** (enough to maintain suitable spawning population)
3. **fair** (not adequate to maintain population)
4. **poor** (not suitable for successful spawning)

USE

Campsites 2-3 **(number)** **Fire pits** 3 **(number)** **Litter** L M H
Trail around lake: ______ **complete** X **partial, trampled:** YES NO
Access: X **good trail** ______ **poor trail** ______ **cross country**

BIOLOGICAL

Zooplankton Composition and Density

Genera Identified	% of sample	Size	Density (o/l)

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Parker Lake

INSECT COMPOSITION AND ABUNDANCE

Aquatic Genera	Relative abundance			Terrestrial Genera	Relative abundance		
	L	M	H		L	M	H
	L	M	H		L	M	H
	L	M	H		L	M	H
	L	M	H		L	M	H

FISH SURVEY

Fishermen 1 **(numbers)** **Hours fished** 1 **(total)**
Fish caught 0 **Fish/hour** ______ **Abundance L M H**

LENGTH FREQUENCY **(Collection Method: ____ angling:** X **gill net\net hrs** 6 **)**

Species	Total Length in mm								
	0-49	50-99	100-149	150-199	200-249	250-299	300-349	350-399	400+
Grayling-gillnet				2	1				
Grayling - angling				11	1				
Total				13	2				

FISH CONDITION

	Total Length (mm)		Weight (g)		Condition (K)	
Species	mean	range	mean	range	mean	range
Grayling	179.8	160-220	50.2	34-90	0.85	0.74 to 0.93

STOCKING HISTORY

Year	Species	Number of Fish	Comments

COMMENTS:

Idaho Fish and Game
Mountain Lake Survey Form

LAKE NAME: Swede (Colburn) **DATE:** 08 / 24 / 95

IDFG Catalog #: _ _:_ _:_ _ _ _:_ _ _ _ **EPA #:** ____

Major Drainage Sand Creek **Minor Drainage:** Colburn Creek
County: Bonner **Region:** 1
USFS Ranger Dist: Sandpoint **Wilderness Area:** ____
Section: 17 **Township:** 58N **Range:** 2W **Elevation:** 5,400 **feet**
GPS (lat/long) N48°22'57" W116°37'30"

PHYSICAL:

Lake Type: 1 **1. cirque 2. moraine 3. slump 4. caldera 5. beaver**
Total Surface Area: 1 . 2 **Hectares**
Depth profile: 3 **Aspect:** 3

1. deep	(75%) of lake >6m deep)	1.	Lake has north facing exposure
2. moderate	(50%) of lake >6m deep)	2.	Lake has south facing exposure
3. shallow	(25%) of lake >6m deep)	3.	Lake has east facing exposure
Maximum Depth 4.3 meters		4.	Lake has west facing exposure
Average Depth 2.1 meters		5.	Lake is exposed in all directions

CHEMICAL

Alkalinity 40 **mg/l** **pH** 7.65
Conductance 12 **umho/cm^2 @ 25C** **Temp (surface)** 14 . 0 **C**
Secchi Depth 4.3+ **meters** **Temp (bottom)** 12 . 9 **C**

SPAWNING POTENTIAL

Inlet(s) 0 **(number)** **Outlet(s)** 0 **(number)**
Length accessible for spawning -- **meters** **Length accessible for spawning** -- **meters**
Inlet spawning suitability: NA **Outlet spawning suitability:** NA

1. excellent (abundant)
2. adequate (enough to maintain suitable spawning population)
3. fair (not adequate to maintain population)
4. poor (not suitable for successful spawning)

USE

Campsites 0 **(number)** **Fire pits** 0 **(number)** **Litter** L M H
Trail around lake: X **complete** ____ **partial, trampled:** YES NO
Access: X **good trail** ____ **poor trail** ____ **cross country**

BIOLOGICAL

Zooplankton Composition and Density

Genera Identified	% of sample	Size	Density (o/l)

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Swede Lake

INSECT COMPOSITION AND ABUNDANCE

Aquatic Genera	Relative abundance			Terrestrial Genera	Relative abundance		
	L	M	H		L	M	H
	L	M	H		L	M	H
	L	M	H		L	M	H
	L	M	H		L	M	H

FISH SURVEY - Barren

Fishermen _______ **(numbers)** **Hours fished** _______ **(total)**
Fish caught _______ **Fish/hour** _______ **Abundance** L M H

LENGTH FREQUENCY **(Collection Method: ____ angling: ____ gill net\net hrs ____)**

	Total Length in mm								
Species	0-49	50-99	100-149	150-199	200-249	250-299	300-349	350-399	400+
Total									

FISH CONDITION

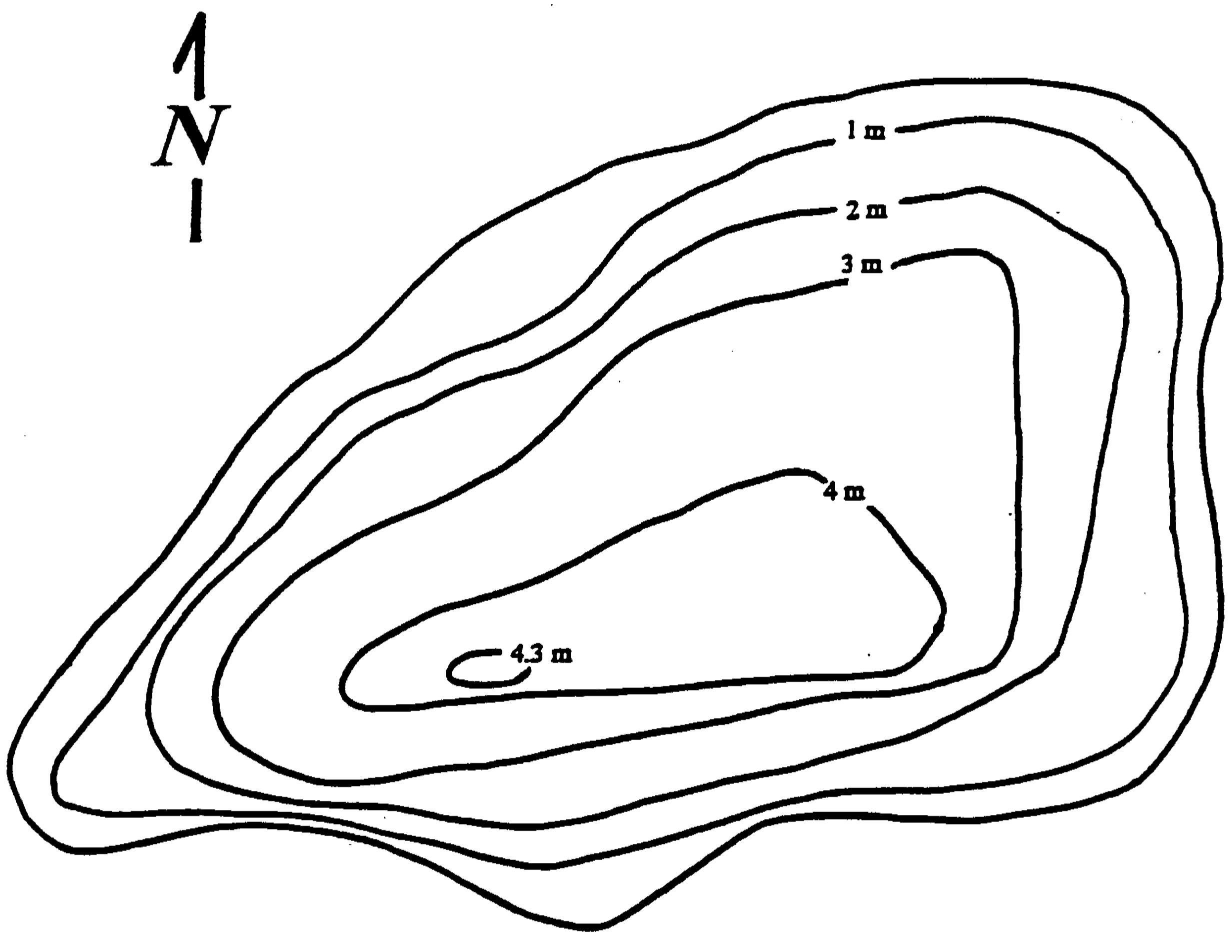
	Total Length (mm)		Weight (g)		Condition (K)	
Species	mean	range	mean	range	mean	range

STOCKING HISTORY

Year	Species	Number of Fish	Comments
Never	Stocked		

COMMENTS: Lake is located on land managed by Schweiter Mountain Ski resort - Barren cirque lake they requested that we stock with fish. Possible put&grow ctt.

Map of Swede Lake (Colburn Lake), Bonner County, Idaho, with depth contours and other physical and chemical parameters.



Survey date August 24,1995

depth	temp (C°)	D.O.
surface	14.0	8.2
1m	13.5	8.2
2m	13.1	8.0
3m	12.9	7.9
4m	12.9	7.9

location = NW ¼ S17 T58N R2W
N48° 22' 57" - W116° 37' 30"
elevation = 1,646
surface area = 1.2 ha
mean depth = 2.1 m
max depth = 4.3 m
volume = 20.72 acre-feet
secchi = 4.3+ m
pH = 7.65
alkalinity = 40 mg/l
conductivity = 12 umhos
T D S = 10 mg/l

Idaho Fish and Game
Volunteer
Mountain Lake Survey Form

Lake Name: Mollies Lake Date: 07 / 24 / 95

IDFG Catalog #: - -:- -:- - - -:- - - - - EPA #:

Major Drainage: Priest Lake Minor Drainage: Bugle Creek

County: Boundary Region: Panhandle

~~USFS Ranger Dist.:~~ (IDL) Wilderness Area:

Section: 35 Township: Range: Elevation: (feet)

USE

Campsites: 1 (poor) (number) Fire pits: 2 (number) Litter: x none L M H

Trail around lake: complete x partial, trampled: Yes No

Access: good trail x poor trail cross country

BIOLOGICAL

Fish survey

Fishermen: 1 (numbers) Hours fished: 0.5 (total)

Fish caught: 2 Fish / hour 4.0 Fish abundance: L M x H

Length Frequency

Total Length in mm (inches)

Species	0-49 (1-2)	50-99 (2-4)	100-149 (4-6)	150-199 (6-8)	200-249 (8-10)	250-299 (10-12)	300-349 (12-14)	350-399 (14-16)	400+ (16+)
CT					2				
Total									

Stocking History

Year	Species	Number of Fish	Comments

Comments:
Very little use. Poor trail to area. Mosquito heavier. Fish were deep-bodied and looked in excellent shape. Emergent equisetum around entire lake.

Idaho Fish and Game
Volunteer
Mountain Lake Survey Form

Lake Name: Harrison Date: 07 / 29 / 95

IDFG Catalog #: - -:- -:- - - -:- - - - - EPA #:

Major Drainage: Pack River Minor Drainage:

County: Bonner - Boundary Region: Panhandle

USFS Ranger Dist.: Sandpoint - Bonners Ferry Wilderness Area: N/A

Section: Township: Range: Elevation: 6,000+ (feet)

USE

Campsites: 3 (number) Fire pits: 4 (number) Litter: ____ L X M ____ H

Trail around lake: ____ complete X partial, trampled: Yes ____ No X

Access: X good trail ____ poor trail ____ cross country

BIOLOGICAL

Fish survey

Fishermen: 3 (numbers) Hours fished: 3 (total)

Fish caught: 10 Fish / hour 3.5 Fish abundance: ____ L ____ M X H

Length Frequency

Total Length in mm (inches)

Species	0-49 (1-2)	50-99 (2-4)	100-149 (4-6)	150-199 (6-8)	200-249 (8-10)	250-299 (10-12)	300-349 (12-14)	350-399 (14-16)	400+ (16+)
CT		10							
Total									

Stocking History

Year	Species	Number of Fish	Comments

Comments:

Excellent kids lake, probably some larger fish but unable to explore fully due to ti constraints.

Idaho Fish and Game
Volunteer
Mountain Lake Survey Form

Lake Name: Snow Lake   Date: 08 / 08 / 95

IDFG Catalog #: - -:- -:- - - -:- - - - - EPA #:

Major Drainage: Kootenai River   Minor Drainage: Snow Creek

County: Boundary   Region: Panhandle

USFS Ranger Dist.: Bonner   Wilderness Area:

Section: 10   Township: T61N   Range: R2W   Elevation: 5,921 (feet)

USE

Campsites: 2 (number)   Fire pits: 2 (number)   Litter: X L ___ M ___ H

Trail around lake: ___ complete X partial, trampled: Yes ___ No X

Access: X good trail ___ poor trail ___ cross country

BIOLOGICAL

Fish survey

Fishermen: 2 (numbers)   Hours fished: 4 (total)

Fish caught: 15   Fish / hour 5   Fish abundance: ___ L ___ M X H

Length Frequency

Total Length in mm (inches)

Species	0-49 (1-2)	50-99 (2-4)	100-149 (4-6)	150-199 (6-8)	200-249 (8-10)	250-299 (10-12)	300-349 (12-14)	350-399 (14-16)	400+ (16+)
C2				5	7	3			
Total									

Stocking History

Year	Species	Number of Fish	Comments

Comments:
One 12" female looked stunted (thin body). Both females had eggs. Three fish kept; 1 8", 1 10", 1 12".

Idaho Fish and Game
Volunteer
Mountain Lake Survey Form

Lake Name: Standard Date: 09 / 30 / 95

IDFG Catalog #: - -:- -:- - - -:- - - - - EPA #: ______

Major Drainage: Priest River Minor Drainage: Two Mouth

County: Bonner Region: 1

USFS Ranger Dist.: Priest Lake Wilderness Area: ______

Section: ______ Township: ______ Range: ______ Elevation: 6,000+ (feet)

USE

Campsites: 1 (number) Fire pits: 2 (number) Litter: X L ____ M ____ H

Trail around lake: ______ complete X partial, trampled: Yes X No ______

Access: ______ good trail ______ poor trail ______ cross country

BIOLOGICAL

Fish survey

Fishermen: 1 (numbers) Hours fished: 1 (total)

Fish caught: 1 Fish / hour 1 Fish abundance: X L ____ M ____ H

Length Frequency

Total Length in mm (inches)

Species	0-49 (1-2)	50-99 (2-4)	100-149 (4-6)	150-199 (6-8)	200-249 (8-10)	250-299 (10-12)	300-349 (12-14)	350-399 (14-16)	400+ (16+)
CT				1					
Total									

Stocking History

Year	Species	Number of Fish	Comments

Comments:

Took several hours to locate new trail head, left little time to fish. Backcountry horsemen have upgraded trail to level 1, road level 3 at best. State has little interest in recreation in this area.

1995 ANNUAL PERFORMANCE REPORT

State of: Idaho

Program: Fisheries Management F-71-R-20

Project I: Surveys and Inventories

Subproject I-A: I-A Panhandle Region

Job: b

Title: Lowland Lake Investigations

Contract Period: July 1, 1995 to June 30, 1996

ABSTRACT

A creel survey was conducted on Hayden Lake during July 1, 1994 through June 30, 1995. Anglers fished for an estimated 85,595 hours. Anglers caught an estimated 52,289 fish for a catch rate of 0.61 fish/h. No fin-clipped cutthroat trout *Oncorhynchus clarki* and very few fin-clipped rainbow trout *O. mykiss* were observed in the creel. It was unclear what was causing the poor return rate for hatchery-reared trout. Possible causes included loss of fish through the outlet, predation, trout strain stocked, and rearing facilities.

Survey questionnaires were mailed to Hayden Lake property owners and handed out to anglers fishing Hayden Lake. Anglers and lake front property owners supported the quality fishery management program on Hayden Lake.

A creel survey was begun on Coeur d'Alene Lake on July 1, 1995 and will be completed June 30, 1996. During the first six months, anglers fished for an estimated 161,725 hours. They caught an estimated 54,941 fish for a catch rate of 0.34 fish/h. Kokanee salmon *O. nerka kennerlyi* provided the most fish caught. Most of the fishing effort was for chinook salmon *O. tshawytscha.*

The estimated population of all age classes of kokanee in Coeur d'Alene Lake was 8.37 million in 1995 based on midwater trawling. Age 2 and age 3 kokanee were very strong year classes. Mean length of kokanee spawners was 248 mm and 228 mm for male and female kokanee, respectively.

The number of chinook salmon redds counted in the Coeur d'Alene and St. Joe rivers in 1995 totaled 65. The number of chinook salmon fingerlings stocked into Coeur d'Alene Lake in 1995 totaled 30,200.

The estimated population of all age classes of kokanee in Pend Oreille Lake was 9.99 million fish in 1995 based on midwater trawling estimates. Simrad hydroacoustic estimates for all age classes of kokanee in Pend Oreille Lake in 1995 was 12.77 million fish.

The estimated population of all age classes of kokanee in Spirit Lake was 281,000 fish in 1995 based on midwater trawling estimates.

Simrad hydroacoustic surveys were conducted on Priest and Upper Priest lakes in 1995 in an attempt to make a population estimate for lake trout. The estimated number of lake trout (sonar targets

identified as fish 330 mm and greater in length) in Priest Lake was 24,732. Limited data precluded the estimate of fish abundance in Upper Priest Lake.

In 1995, 245 lake trout S. *namaycush* from Priest Lake were tagged with reward and non-reward floy tags. Three tags were returned in 1995. One of these tags was from a fish floy-tagged in 1995, the other two tags were from fish floy-tagged in 1988 and 1990.

The largemouth bass *Micropterus salmoides* populations in Swan, Black, and Rose lakes appear to be balanced with Proportional Stock Density (PSD) values of 16, 66, and 24, respectively. The early July sampling may have biased these estimates. Bluegill *Lepomis macrochirus* in Rose Lake appear to be reproducing. The mean back-calculated lengths for bluegill appeared to be in the lower range, but are comparable to Montana, South Dakota, and Oregon.

A bluegill introduction to Kelso Lake in 1984 (400 fish) has established a self-reproducing population and expanded their range into Little Round Lake as well. PSD's for bluegill in Kelso and Little Round lakes were 26 and 59, respectively.

Tiger muskie *Esox lucius* x *E. masquinongy* introductions into Freeman Lake (1989-1991, and 1993) have yielded numerous reported angler catches. In 1995, gill net sampling of Freeman Lake captured one tiger muskie from the 1993 stocking that measured 510 mm.

Impromptu creel census data was collected on Panhandle Region waters by conservation officers. Officers interviewed a total of 4,583 anglers who spent 13,795 hours fishing on 51 lowland lakes in the region.

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OBJECTIVES

1. Evaluate the trout stocking program, i.e., return to the creel, in Hayden Lake.

2. Determine angling effort and harvest on Hayden Lake.

3. Determine angler and property owner attitudes and opinions about the fish management program on Hayden Lake.

4. Determine kokanee salmon *Oncorhynchus nerka kennerlyi* stock status in Coeur d'Alene Lake.

5. Evaluate changes in the kokanee population caused by chinook salmon *O. tshawytscha* predation (chinook population abundance).

6. Predict future kokanee fisheries in Coeur d'Alene Lake based on year class strength and potential egg deposition.

7. Determine the kokanee stock status in Pend Oreille Lake and Spirit Lake.

8. Determine lake trout *Salvelinus namaycush* stock status in Priest Lake.

9. Evaluate the fish community in Swan and Black lakes.

11. Evaluate bluegill *Lepomis macrochirus* introduction into Rose, Kelso and Little Round lakes.

12. Evaluate tiger muskie *Esox lucius x E. masquinongy* introduction into Freeman Lake.

13. Estimate angling effort on Coeur d'Alene Lake, partition effort between kokanee, chinook salmon, and warmwater anglers.

14. Estimate total harvest for each species of fish in Coeur d'Alene Lake, with special emphasis on kokanee, chinook salmon and northern pike *E. lucius*.

METHODS

Angler Creel Census

Hayden Lake

Creel Survey - A roving creel survey was conducted on Hayden Lake (Figure 1) from July 1, 1994 through November 30, 1994 and February 1, 1995 through June 30, 1995.

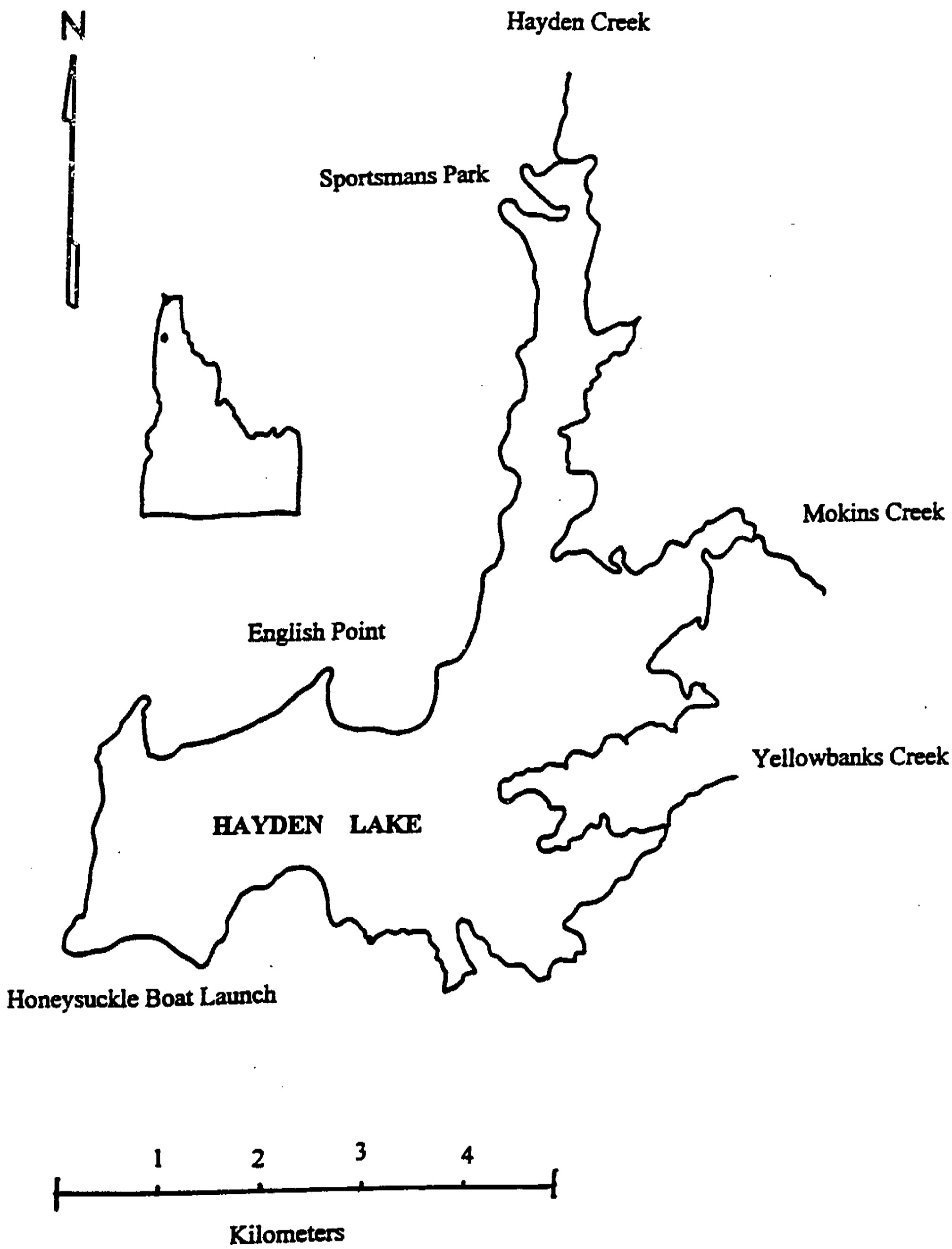

Figure 1. Hayden Lake, Idaho.

The survey period was divided into 21 fourteen-day intervals. Fifty percent of the weekend days and 40% of the weekdays were surveyed. Two instantaneous counts were made per survey day by boat. Each day was divided into two parts, morning and afternoon. All census days and count times were randomly selected. Angler interviews were conducted the same day as the counts. Interviews were conducted on the lake and at the Honeysuckle and Sportsmans Park boat ramps.

The creel survey estimated fishing effort, catch rates, and harvest. Several groups of rainbow trout *O. mykiss* and westslope cutthroat trout *O. clarki lewisi* (20,000 fish per group) were fin-clipped in 1993 and 1994 (Table 1) to evaluate the stocking program. Trout were fin-clipped to help determine what length, what time of the year or what strain of rainbow trout, either domestic Kamloops or domestic Kamloops/steelhead hybrids, would demonstrate the best growth and the best returns to the angler.

The Creel Census System computer program (McArthur 1993) was used to summarize the creel data.

Angler Questionnaire - Two questionnaires were developed to assess the attitudes of Hayden Lake anglers and Hayden Lake lake front property owners (Appendices A and B) with the fishery management program on Hayden Lake. Angler questionnaires were handed out during the interview and only to anglers willing to fill out the lengthy paperwork. Property owners' questionnaires were mailed to the address used by the County Assessor to mail tax notices. Each questionnaire had return postage. The responses were summarized for each question.

Coeur d'Alene Lake

A creel survey on Coeur d'Alene Lake began on July 1, 1995 and is scheduled to end June 30, 1996. The lake was divided into three sections. Chatcolet, Benewah, and Round lakes were included as separate bodies of water (Figure 2). There were 26 fourteen-day intervals in the survey period. Fifty percent of the weekend days and 20% of the weekdays were sampled. All sample days were randomly selected. Boat and angler counts were conducted twice a day by airplane. Anglers were interviewed on the lake or at access points (boat ramps or marinas). Information collected during angler interviews included the number of anglers in the group, total hours fished and hours fished for each species, preferred fish species, and how many of each fish species were caught and released or kept. All fish examined at access points were measured, weighed, and a scale sample or otoliths collected.

Fish Population Characteristics

Coeur d'Alene Lake

Kokanee Abundance - Midwater trawling was used to obtain population estimates for kokanee in Coeur d'Alene Lake as described by Bowler et al. (1978), Rieman and Myers (1990), and Maiolie and Davis (1995). The number of transects surveyed was 24 in 1995 (Figure 3).

Table 1. Cutthroat and rainbow trout stocking in Hayden Lake, Idaho, spring 1993 through spring 1994. Includes number stocked, number fin clipped, and fin clip used.

Date stocked	Species	Strain	Number stocked	Number fin-clipped	Fin clip	Mean length (mm)
May/June 1993	Cutthroat trout	Clark Fork	99,998	20,000	Adipose	163
May 1993	Kamloops rainbow trout	Black Canyon	136,036	20,000	Left ventral	70
October 1993	Kamloops rainbow trout	Kamloops/ steelhead hybrid	57,400	20,000	Right ventral	178
April 1994	Cutthroat trout	Clark Fork	99,991	20,000	Adipose	160
April 1994	Kamloops rainbow trout	Trout Lodge	135,625	20,000	Adipose	128

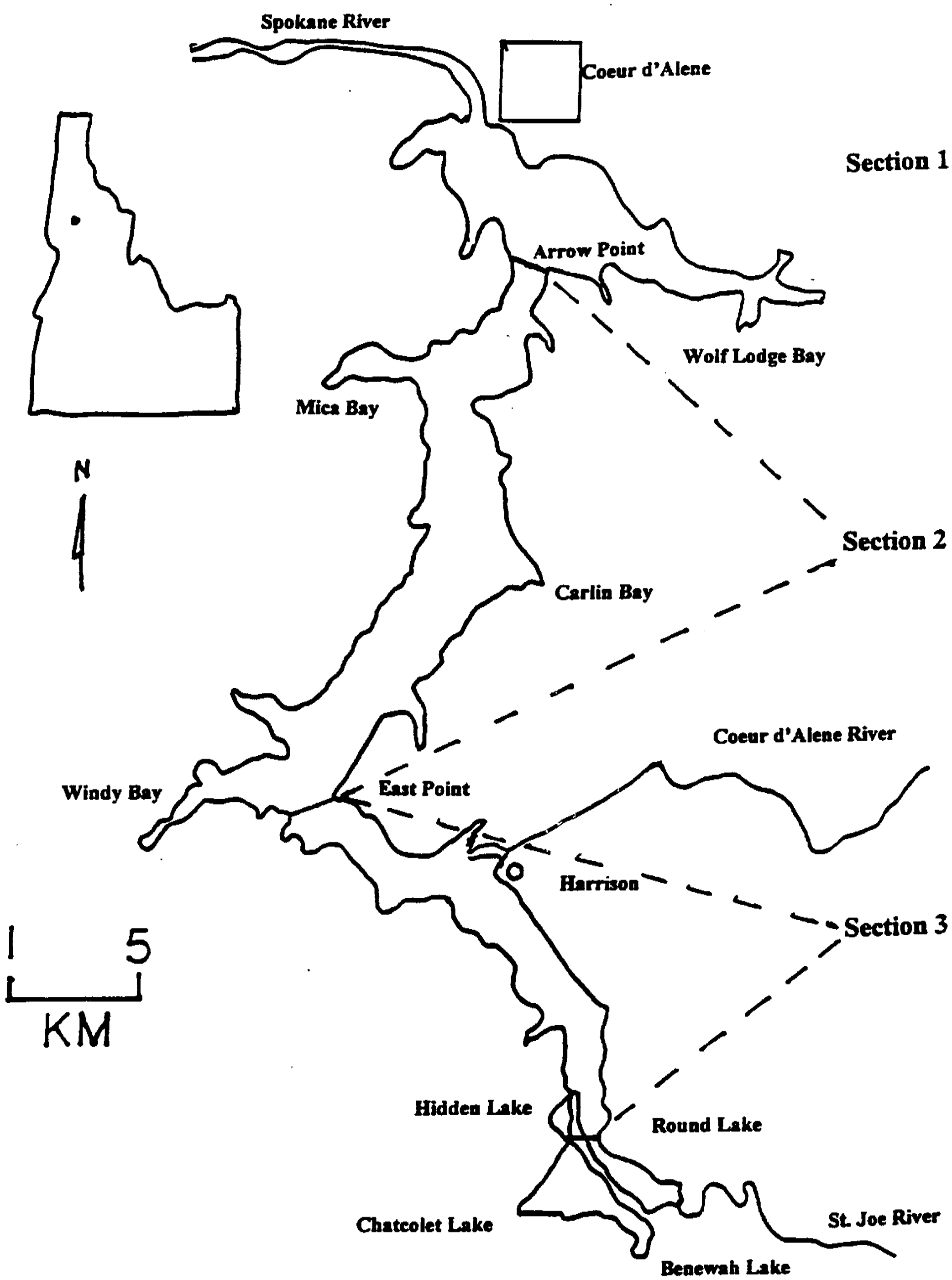

Figure 2. Creel survey sampling sections on Coeur d'Alene Lake, Idaho, 1995-1996.

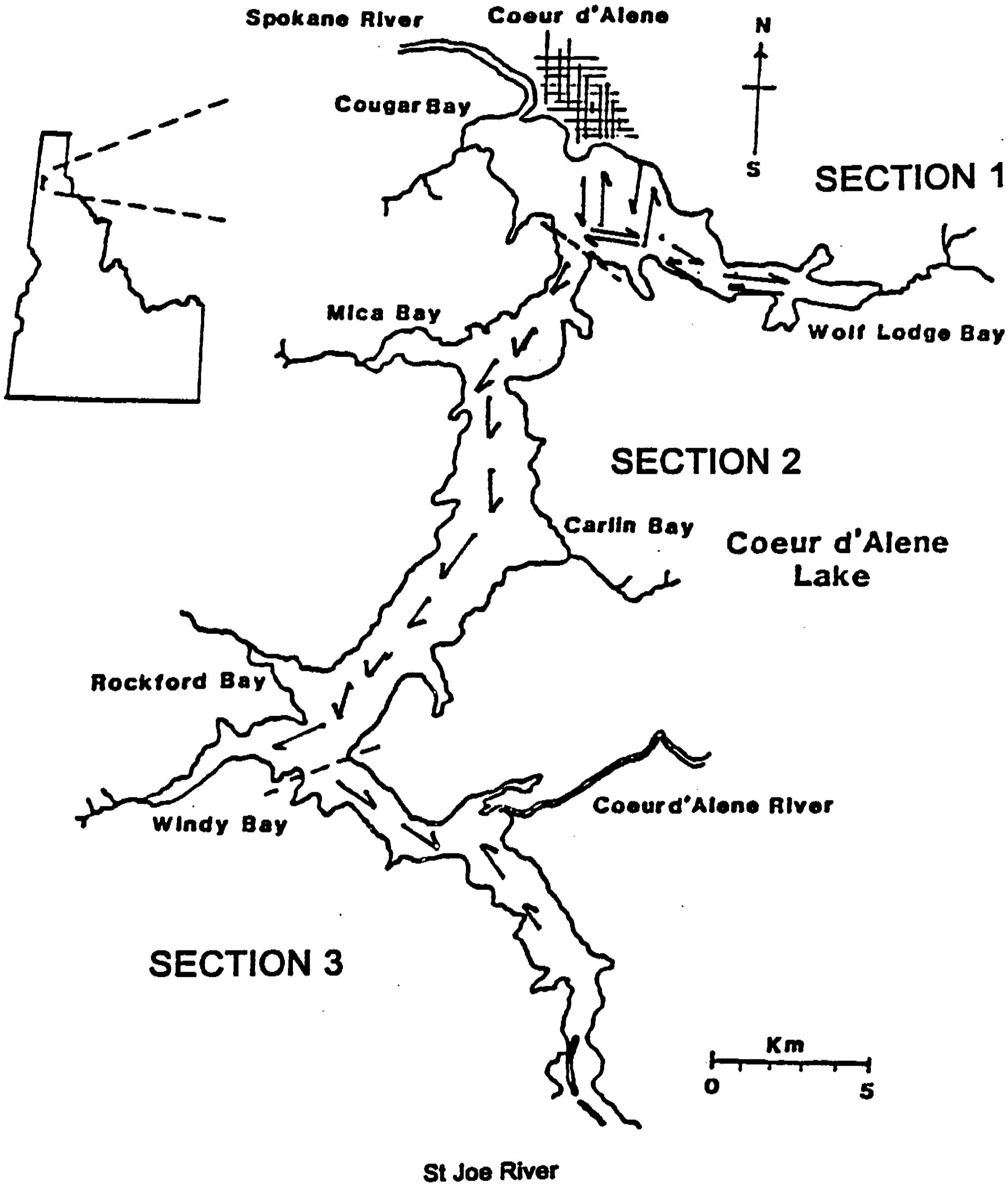

Figure 3. Kokanee mid-water trawling transects in Coeur d'Alene Lake, Idaho, 1995.

Kokanee Length at Spawning - Total lengths (mm) of kokanee spawners were recorded from fish collected in gill nets set along the Coeur d'Alene Lake shoreline near Blue Creek Bay on three nights in November and December 1995. Mean length for each sex was calculated.

Kokanee Fecundity - The average number of eggs produced per female kokanee was calculated using the mean length and the following formula:

$$Y = -947 + 5.26x$$

Where: x = mean length of female kokanee spawners (mm)
Y = mean number of eggs per female

Potential egg deposition was estimated using the following formula:

$$x = [.5(y)]z$$

Where: x = potential egg deposition
y = estimated population of age 3 kokanee
z = estimated eggs/female kokanee

Natural Chinook Abundance - Department personnel conducted chinook salmon redd counts (via helicopter) on the Coeur d'Alene River, North Fork Coeur d'Alene River, South Fork Coeur d'Alene River, Little North Fork Coeur d'Alene River, and St. Joe River on October 4, 1995. Natural chinook salmon abundance was calculated from these redd counts. Biologists estimated 4,000 chinook salmon eggs per redd and assumed a 10% egg-to-smolt survival. A total of 105 redds was needed to produce the desired number of chinook salmon smolts based on these assumptions (42,000 smolts). All redds in excess of 105 will be destroyed as described in Horner et al. (1996b).

Lake Pend Oreille

Kokanee Abundance - Lake Pend Oreille kokanee were sampled during the new moon phase of August of 1995 with a midwater trawl. The methodology, transects, statistical analysis, and kokanee abundance estimates followed techniques described by Bowles et al. (1987). Hydroacoustic methodology was also employed in the August trawl to estimate the kokanee numbers (Maiolie and Elam, In Progress). Kokanee abundance was calculated by a computer model developed by Rieman and Meyers (1990). Kokanee were divided into age classes by peaks in the length frequency distribution of the catch for Lake Pend Oreille and verified by scale and otolith analysis.

Spirit Lake

Kokanee Abundance - Spirit Lake kokanee were sampled with a midwater trawl during the new moon phase on August 27, 1995. Due to the low water conditions in Spirit Lake in July and August, a smaller trawl (7 m with I/O gas power) boat was used again in 1995, the same boat that was used in 1994. The larger midwater trawl (9 m with inboard diesel power) boat, used in previous years on Spirit Lake as well as Lake Pend Oreille and Coeur d'Alene Lake, was not launchable on Spirit Lake in 1994 or 1995 (Horner et al. 1997). Kokanee were divided into age classes by peaks in the length frequency distribution of the catch for Spirit Lake and verified by scale and otolith analysis.

Lake Trout - Priest Lake and Upper Priest Lake

Hydroacoustic Equipment

Hydroacoustic surveys were conducted on Priest and Upper Priest lakes in 1995 in an attempt to quantify lake trout abundance. A Simrad EY500 split-beam scientific echosounder with a 120 kHz transducer was used to document the abundance and distribution of all fish in Priest and Upper Priest lakes. Echograms collected in the field were later analyzed using Simrad EP500 software version 5.0. Boat speed use on Priest Lake was 1.9 to 2.1 m/s. Boat speed on Upper Priest Lake was slower at 1.7 to 1.9 m/s due to shallower water depths. The echosounder was set to ping at 0.7 s intervals, with a pulse width of 0.3 milliseconds. Appendix C contains a complete list of echosounder settings used for the surveys and individual transect echograms. The echosounder was calibrated at the beginning of the surveys using a 23 mm copper calibration sphere with a target strength of about -40.4 db (decibels), depending on temperature. More information of the Simrad EY500 can be found in Maolie and Elam 1995.

Lake Surveys

A series of 15 transects for Priest Lake and three transects for Upper Priest Lake (Figure 4) were selected from predetermined GPS (Global Positioning System) points (Appendix D and E). The transects covered the entire length of both lakes. The surveys were conducted after dark and before dawn on July 10-11, 1995 for Priest Lake and July 11-12, 1995 for Upper Priest Lake. The transects were associated with landmarks on shore, beginning and ending at the 10 m depth contour. Maximum target depth default was set at 100 m. The boat was piloted by visual landmarks, compass headings, and GPS locations. The relative size of fish was related to dB strength readings using the dorsal aspect (Appendix H).

Statistical Analysis of Hydroacoustic Estimates -The Priest Lake transects were combined for the purpose of analysis. Fish densities (fish/ha), by dB frequency (size class), were taken from the Simrad EP500 software analysis and extrapolated to total lake area (Table 2). Confidence intervals for abundance estimates were calculated at both the 90% and 95% level. No fish abundance estimates were made for Upper Priest Lake.

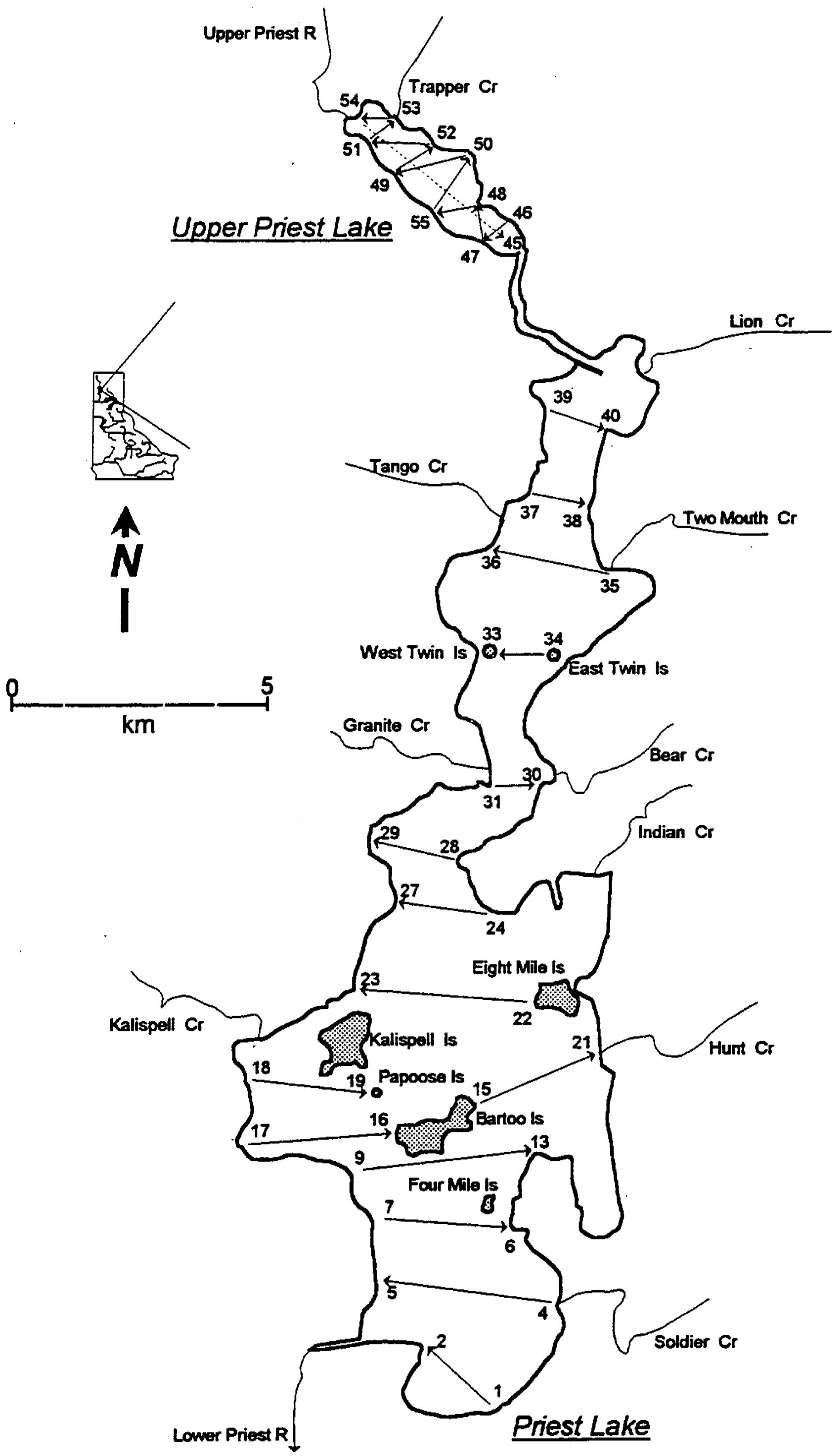

Figure 4. Simrad hydroacoustic transect locations and directions with GPS (Global Positioning System) points for Priest and Upper Priest lakes, Idaho, survey July 10 and 11, 1995.

Table 2. Statistical methods for estimating lake trout abundance in Priest Lake, Idaho, based on Simrad hydroacoustic readings taken July 10 and 11, 1995.

$\bar{x}_i = \sum x/n$	where:	n = the number of transects.
$Se_{xi} = s/\sqrt{n}$		$\hat{N}$ = population estimate = $\bar{x}$ (A).
$V_{xi} = (SE)^2$		A = surface area of Priest Lake = 9,454 ha and Upper Priest Lake = 567 ha
$V_t = V_{xi}\, A^2$		$B_{t(90\%)\text{ or }(95\%)} = t\sqrt{V_t}$ = bounds around the population estimate at 90% and 95% CI
		$t_{df=14} = 1.76$ for 90%
		$t_{df=14} = 2.15$ for 95%

Lake Trout Tagging

To quantify angler exploitation and help define the population dynamics of lake trout in Priest Lake, lake trout were tagged with floy tags in 1995. Lake trout were captured by hook-and-line and a plastic floy tag placed in the dorsal musculature beneath the dorsal fin. The majority of the fish (229 out of the 245 fish tagged) were caught and tagged by Randy Phelps, a volunteer angler. Each fish was measured to the nearest 1/4 inch (6 mm) and weighed to the nearest ounce (28.4 g). Fish were released back to the same water from where they were captured. Carbonated water (club soda) was used as an anesthetic to calm the fish for tagging. A ratio of 10:1 to 15:1 (fresh water:cabonated water) was used in boat live wells. Recovery of the fish was sometimes facilitated by moving the fish back and forth in fresh water while it recovered. Recovery time was generally less than one minute. Some lake trout that were captured at depth and did not have the opportunity to void their air bladder before reaching the surface and were assisted in their return to depth with a weighted release tool (Figure 5). Other lake trout that reached the surface with distended air bladders were "fizzed." The "fizzing" process entails inserting a small gauge hypodermic needle into the fish at a point midway between the anal vent and pelvic fins and midway between the ventral line and the bottom of the belly into the air bladder. The needle is inserted at a slight angle forward until air is heard escaping. The fish is "fizzed" in the water until it can swim down on its own. While there is little published information available on the survival of fish that have had their air bladders punctured to allow them to descend to depth, there is always the chance of infection and organ damage. The use of a "fizzing" needle on tagged fish was recorded for each tag number to evaluate the survival of "fizzed" fish. Both reward tags ($10.00) and non-reward tags were used to tag lake trout. Catch location, date, fish length and weight, and any comments regarding the health or release of the fish were recorded at the time of tagging along with the tag number.

Standard Lowland Lake Surveys

Six Panhandle Region lakes, Swan, Black, Rose, Freeman, Kelso, and Little Round, were surveyed in 1995 using the Department of Fish and Game Standard Lake Survey Methodology. Swan, Black, and Rose lakes are located adjacent to the lower Coeur d'Alene River and are included in the 'Chain Lakes' (Figure 6). Kelso and Little Round lakes are in the Hoodoo Creek drainage, Bonner County, Idaho (Figure 7). Freeman Lake is located approximately 9 km northeast of the town of Priest River, Idaho.

RESULTS AND DISCUSSION

Angler Creel Census

Hayden Lake

Creel Survey - During the past several years, anglers have complained about the declining trout fishery in Hayden Lake. A multi-year study began in 1993 to assess the fish populations and the fishery

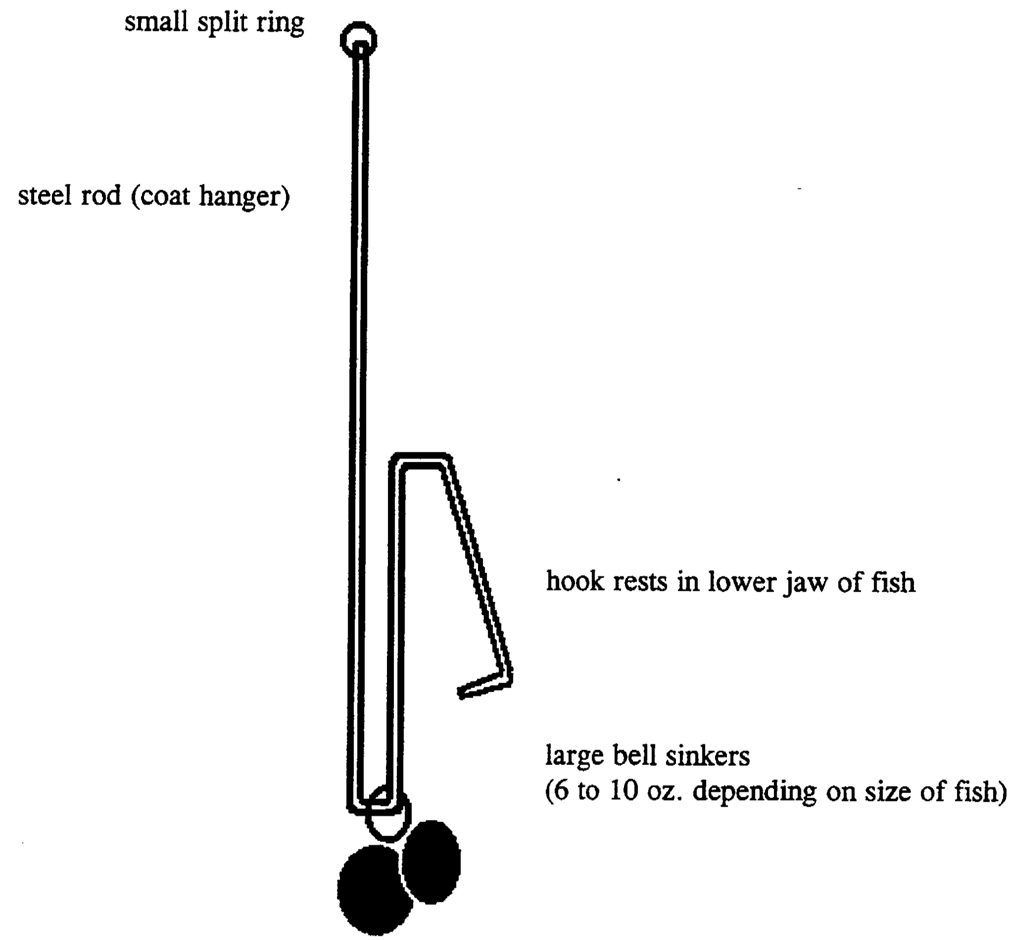

Figure 5. Weighted release tool used to send lake trout with distended gas bladders back to depth. Once at depth, the gas bladder shrinks back to a more normal size and the fish can swim off the end of the release tool.

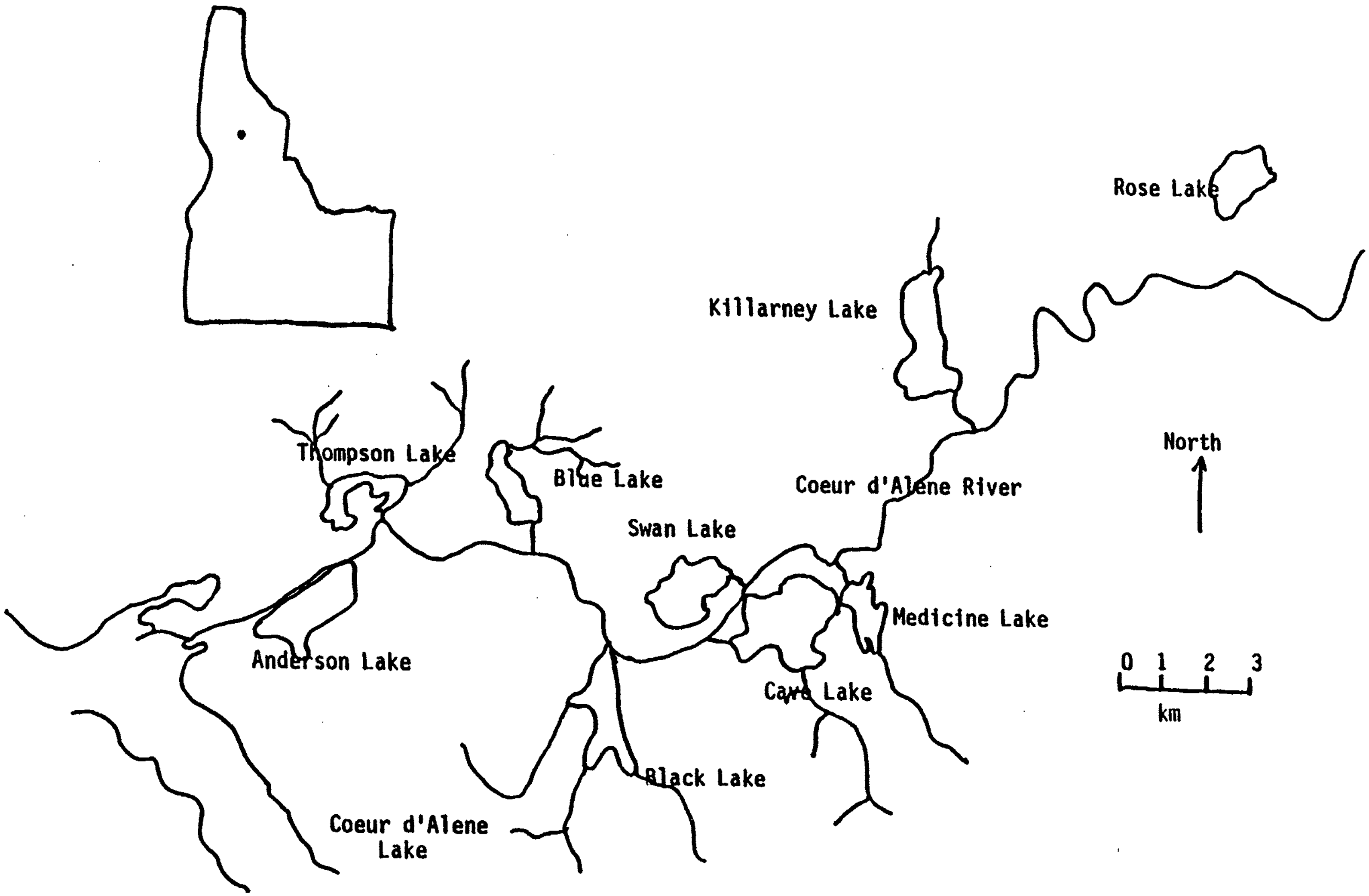

Figure 6. Location of Swan, Black, and Rose lakes, Idaho.

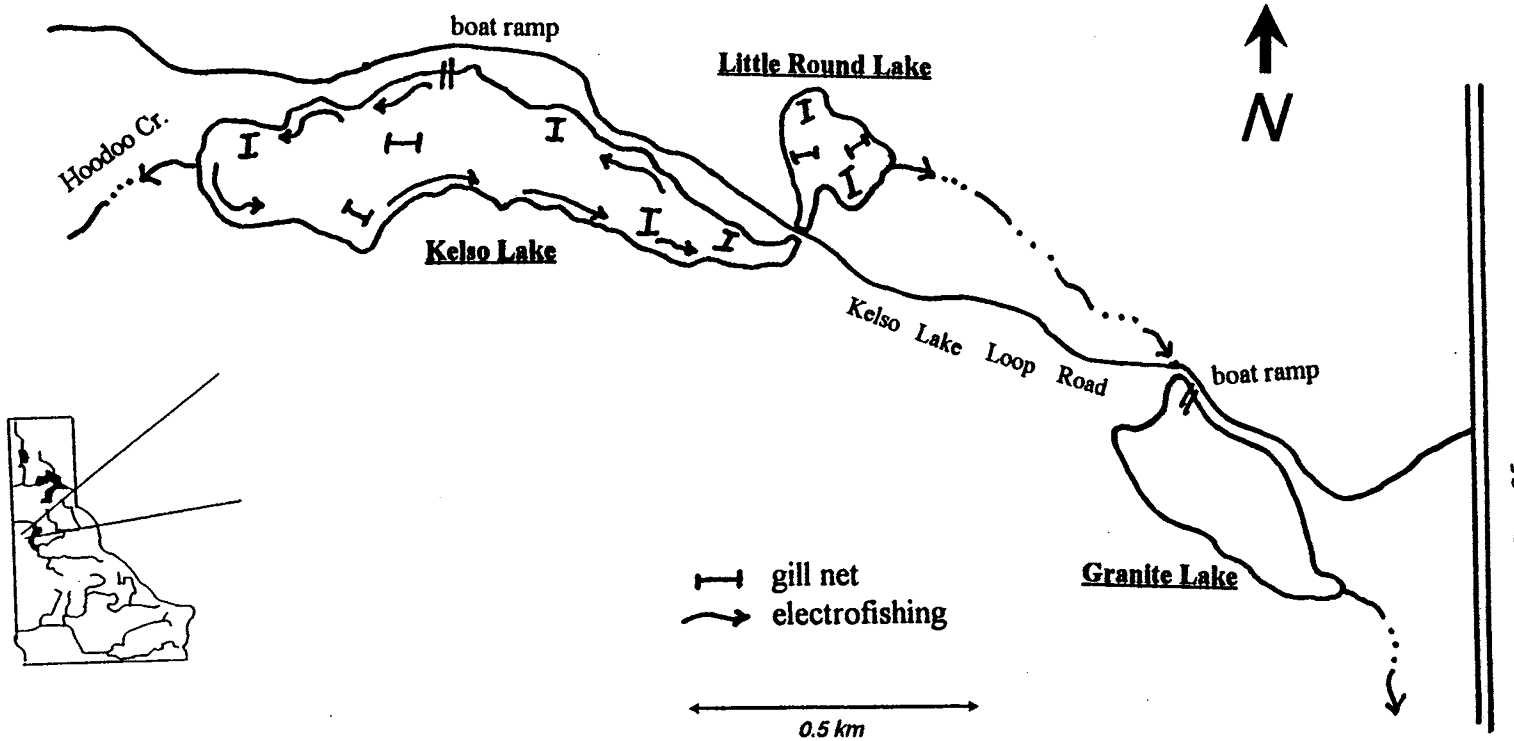

Figure 7. Map of Kelso, Little Round and Granite lakes, Idaho, showing 1995 gill net and electrofishing locations.

in Hayden Lake. The main goal was to determine if there actually is a decline in the fishery, and if so, what factors may be contributing.

Anglers fished for an estimated total of 85,595 hours, 28,375 hours from July 1 to December 31, 1994 and 57,220 hours from January 1 to June 30, 1995 (Table 3). They caught an estimated total of 52,289 fish, 28,124 fish in 1994 and 24,165 fish in 1995 (Table 4). Yellow perch *Perca flavescens* was the most abundant species harvested followed by northern pike, rainbow trout, black crappie *Pomoxis nigromaculatus*, smallmouth bass *Micropterus dolomieu*, and cutthroat trout (Table 4). Special regulations on bass, black crappie, and trout (Table 5), designed to produce a quality fishery, reduced the potential harvest of these species.

Previous creel surveys on Hayden Lake were conducted in 1979 and 1982 (Goodnight and Mauser 1980, and Ellis 1983). Fishing effort has increased more than 100% since the 1982 survey (Table 6). Number of fish caught has also doubled (Table 6). The increase in numbers of fish caught in 1994-1995 appeared to be the result of the legal introduction of smallmouth bass and the illegal introduction of northern pike (Table 6).

The number of trout caught and harvested was very similar to estimates from the 1982 creel survey (Table 6). However, there was a decline in the number of cutthroat trout harvested since the 1982 creel survey (Table 6). It is not clear what has caused this decline. Possible causes include loss of fish through the outlet, predation, survival of the strain of cutthroat trout stocked into Hayden Lake, water chemistry at the hatchery where the trout were raised, or a combination of all four.

Loss of trout from Hayden Lake is a periodic problem associated with high lake levels resulting in spill into an ephemeral outlet stream. The outlet is screened with a large mesh trash screen that does not prevent loss of juvenile fish. Occasionally, the screen is removed when debris has threatened to wash out the outlet structure. Several weeks of spill is normal in a normal water year. Very little or no spill occurred during the recent drought years. A prolonged spill occurred in 1996.

Young hatchery trout can be lost when stocking schedules necessitate releases at the Honeysuckle boat ramp during spill periods. Natural fish are also lost because they tend to 'home in' to the Honeysuckle area when they are looking for a place to spawn. Although no fin-clipped cutthroat trout were observed in the creel in 1994 and 1995, numerous fin-clipped and unclipped cutthroat trout of similar length (400 mm) were harvested by anglers in the outlet stream in the spring of 1996. Record high flows and lake levels from winter floods resulted in over three months of spilling and the removal of the outlet screen. Fall stocking of juvenile trout and utilizing different stocking locations around the lake may help reduce loss of trout from the lake.

Predation on stocked trout by smallmouth bass, northern squawfish *Ptychocheilus oregonensis*, and northern pike may be quite extensive. The northern stocking site for trout is located at the uppermost end of a relatively shallow weedy arm of the lake that is ideal habitat for largemouth bass *M. salmoides* and northern pike. The rocky shorelines are an ideal smallmouth bass habitat. Stocked fingerlings must move down this arm to reach deeper trout water, often following the shoreline, and are vulnerable to predation. Elimination of this stocking site would likely reduce predation of stocked trout. However, Hayden Creek, located at the upper end of this arm, is the major spawning stream for westslope cutthroat and rainbow trout. Increases in the number of northern pike will likely have a detrimental effect on returning adults as well as juveniles.

Table 3. Estimated fishing effort from a boat, bank, float tube, and through the ice on Hayden Lake, Idaho, 1994-1995. (Estimated fishing effort per hectare, 47 hours.)

Creel period	Estimated effort from boat anglers	Estimated effort from bank anglers	Estimated effort from tube anglers	Estimated effort from ice anglers	Total estimated effort
July 1 - November 30, 1994	22,833	5,542	0	0	28,375
February 1 - June 30, 1995	31,322	24,801	34	1,063	57,220
Totals	54,155	30,343	34	1,063	85,595

Table 4. Total estimated number of fish kept, released, and caught, and estimated number of fish harvested by species from Hayden Lake, Idaho, 1994-1995.

	Creel period		
Estimated totals	7/1/94 to 11/30/94	2/1/95 to 6/30/95	Total
Fishing effort (h)	28,375	57,220	85,595
Fish kept	6,472	5,413	11,885
Fish released	21,652	18,752	40,404
Fish caught	28,124	24,165	52,289
Unmarked rainbow harvested	415	1,109	1,524
LV clipped rainbow harvested	0	63	63
RV clipped rainbow harvested	0	34	34
AD clipped rainbow harvested	0	11	11
Umarked cutthroat harvested	125	184	309
AD clipped cutthroat harvested	0	0	0
Largemouth bass harvested	180	0	180
Smallmouth bass harvested	313	0	313
Crappie harvested	845	617	1,462
Perch harvested	3,148	1,596	4,744
Northern pike harvested	1,004	915	1,919
Sunfish harvested	44	0	44
Other fish harvested[a]	257	11	268

[a] Other fish included brown bullheads, tench, squawfish, and suckers.

Table 5. Fishing regulations for trout, bass, and black crappie, in Hayden Lake, Idaho, 1995.

Species	Open season dates	Possession limit	Special rules
Trout	Year round	2	None under 14"
Cutthroat			
Rainbow			
Splake			
Kokanee			
Bass	Jan. 1 - June 30	0	Closed to harvest
	July 1 - Dec. 31	2	None between 12"-16"
Black crappie	Year round	15	None under 10"

Table 6. Comparison of creel survey results for Hayden Lake, Idaho, in 1979, 1982, and 1994-95.

	1979[a]		1982[b]		1994-95[c]	
Effort (h)	10,150		13,060		85,595	
Species	Catch	Harvest	Catch	Harvest	Catch	Harvest
All trout	--	468	4,261	1,389	4,258	1,941
Rainbow	--	166	--	250	3,066	1,632
Cutthroat	--	302	--	904	1,189	309
Cutthroat x Rainbow	--	--	--	235	--	--
Largemouth bass	--	--	64	53	6,088	180
Smallmouth bass	--	--	--	--	16,034	313
Crappie	--	--	1,876	1,876	4,971	1,462
Perch	--	--	4,576	4,377	--	4,744
Northern pike	--	--	--	--	--	1,919
Other	--	--	--	--	20,386[d]	312
TOTAL	--	468	10,770	9,004	52,289	10,871[e]
Catch rate trout (fish/h)	--	0.05	0.33	0.11	0.06	0.02
Catch rate all (fish/h)	--	--	0.83	0.70	0.61	0.13

[a] Survey summary dates 6/23/79 to 11/30/79.
[b] Survey summary dates 6/26/82 to 10/15/82.
[c] Survey summary dates 7/1/94 to 11/30/94 and 2/1/95 to 6/30/95.
[d] Total includes perch, northern pike, sunfish, brown bullheads, and nongame fish.
[e] Total differs from total fish kept in Table 3 because some harvested fish were not identified by species and were not counted in the harvest by species.

The annual number of cutthroat trout stocked into Hayden Lake has increased (Table 7), but harvest has decreased. Prior to the 1982 creel survey, a total of 328,410 cutthroat trout fry were released into Hayden Lake tributaries between 1967 and 1973, and 618,329 fingerlings were released between 1977 and 1983 (Table 7). The number stocked per year ranged from 10,120 in 1973 to 292,805 in 1982. A total of 1,222,846 cutthroat trout fingerlings (75 to 150 mm) have been stocked into Hayden Lake between 1986-1995 (Table 7). More and larger cutthroat trout have been stocked into Hayden Lake in the last 10 years than from 1967 to 1982 (no cutthroat trout were stocked in 1984-85). The number of westslope cutthroat trout stocked does not appear to be a major factor in the decline of harvested fish.

The decline in cutthroat trout harvest may be attributed to the strain of westslope cutthroat trout stocked into Hayden Lake. The majority of cutthroat trout stocked into Hayden Lake has been the Clark Fork strain, which most recently came from Kings Lake, Washington. This stock originated from Priest Lake in the 1940s. These fish have been domesticated for more than 50 years. Domestication may have selected for faster growing hatchery-reared fish. Once stocked, these trout may grow fast and mature early. Typically, there is a large mortality of first time spawning trout. If these fish are maturing, spawning, and dying before they reach the legal harvest size of 355 mm (14 inches), fewer cutthroat trout are available for harvest.

In March and May 1995, only nine cutthroat trout were collected by gill nets. One 420 mm total length (TL) cutthroat trout had an adipose fin clip. This trout was probably from the 1993 stocking. The other eight cutthroat trout ranged from 256 mm TL to 470 mm TL. Five of these fish had scales that were readable. There were two age 2 fish that ranged 265-317 mm TL and three age 3 fish that ranged 392-425 mm TL. The age 2 fish were immature and the age 3 fish were mature. Adfluvial westslope cutthroat trout from Coeur d'Alene Lake mature at 4-6 years old and domestic westslope cutthroat trout mature at 3-4 years old. It is unclear if westslope cutthroat trout are maturing, spawning, and dying before they reach harvestable length. The lack of individual cutthroat trout in sampling gear and in the harvest has severely restricted meaningful evaluation of age, growth, maturity, and vulnerability to angling gear.

In addition to the hatchery-raised component of cutthroat trout, there is an unknown quantity of wild cutthroat trout entering the lake each year. Casual observations and redd counts in Hayden Creek indicate that natural reproduction may be declining. In 1988, the trout fishing season on Hayden Lake was changed from the end of April through the end of November to open all year. This resulted in an increase in fishing pressure on spawning cutthroat and rainbow trout staging in Hayden Creek inlet prior to spawning. The increased harvest on spawning trout may have caused some of the reduction in redd numbers in recent years. In 1996, the trout season on Hayden Lake was changed back to what it was in 1987. The amount of natural reproduction occurring in the tributaries was not investigated during this study.

Several changes have occurred in Hayden Lake since the high harvest rates in 1979 and 1982 that may have affected the harvest of westslope cutthroat trout. More juvenile rainbow trout are stocked now than in the past (Table 7). There may be some competition for food and space between the juvenile trout.

Another major change in Hayden Lake was the introduction of smallmouth bass and the illegal introduction of northern pike. Both fish are top-of-the-line predators. Increasing the length of stocked cutthroat trout may increase survival by reducing potential size related predation. Some additional study is needed to determine the cause for the poor recruitment of cutthroat trout to the Hayden Lake fishery.

Table 7. Fish releases in Hayden Lake, Idaho, and its tributary streams (1889-1995).

Year	Species	Size and number released			
		Fry	75-150 mm	>150 mm	Unknown
1889	Mountain whitefish	20,000			
1936	Westslope cutthroat	145,000			
1937	Westslope cutthroat	160,000			
1938	Westslope cutthroat	178,000			
1939	Westslope cutthroat				15,840
	Rainbow				28,875
1940	Westslope cutthroat	221,000			
	Rainbow				14,000
1941	Westslope cutthroat	186,000			
	Rainbow				64,400
1942	Westslope cutthroat	165,420			
	Rainbow	56,400		1,056	
1943	Westslope cutthroat				8,945
	Rainbow	60,800			28,660
	Kamloops				5,015
1944	Westslope cutthroat				
	Rainbow	47,125		1,085	
1945	Westslope cutthroat	97,563			
	Rainbow			2,280	25,860
1946	Westslope cutthroat	60,000			
	Rainbow		13,625	3,875	
1947	Westslope cutthroat	30,800			
	Rainbow	30,600	28,750	1,550	
1948	Westslope cutthroat	10,400			
	Rainbow	138,388		3,344	
1949	Westslope cutthroat	128,500			
	Rainbow	56,480		3,500	
1950	Westslope cutthroat	163,200			
	Rainbow	27,295		6,010	
1951	Westslope cutthroat	106,916			
	Rainbow	71,460		6,300	
1952	Rainbow	51,700		4,760	
1953	Rainbow	87,750		19,500	
1954	Westslope cutthroat	178,880			
	Rainbow	207,000		24,245	
1955	Westslope cutthroat	120,000			
	Rainbow	121,600		4,000	
1956	Westslope cutthroat	105,000			
	Rainbow	192,500		6,857	
1957	Westslope cutthroat	80,000			
	Rainbow	90,000		6,720	
1958	Rainbow			6,710	

Table 7. Continued.

Year	Species	Size and number released			
		Fry	75-150 mm	>150 mm	Unknown
1959	Westslope cutthroat	30,000			
	Rainbow	80,000		6,930	
1961	Rainbow			10,000	
1962	Rainbow	81,000		12,000	
1963	Rainbow	80,640		8,890	
1964	Rainbow	67,840		32,400	
1967	Henrys Lake cutthroat	51,800			
	Rainbow			13,710	9,840
1970	Henrys Lake cutthroaqt	93,466			
	Rainbow			16,050	
	Coho	216,940			
1971	Henrys Lake cutthroat	61,776			
	Rainbow			23,640	
	Coho	303,264			
1972	Henrys Lake cutthroat	41,700			
	Rainbow			14,395	
	Coho	376,610			
1973	Henrys Lake cutthroat	10,120			
	Rainbow			14,750	
	Coho	406,242			
1974	Rainbow			5,758	
1975	Rainbow			4,800	
	Kokanee	121,500			
1976	Rainbow			8,800	
	Kokanee	60,400			
1977	Westslope cutthroat		30,000		
1978	Westslope cutthroat		52,747		
1979	Westslope cutthroat		53,846		
1980	Westslope cutthroat		12,432		
1981	Westslope cutthroat		134,243		
1982	Westslope cutthroat		292,805		
1983	Westslope cutthroat		42,256		
	Kamloops (domestic)		132,490		
	Smallmouth bass		213		
1984	Kamloops (domestic)		355,950		
	Kamloops (wild)		88,445		
1985	Kamloops (domestic)		168,135		
	Kamloops (wild)	3,531			

Table 7. Continued.

Year	Species	Size and number released			
		Fry	75-150 mm	>150 mm	Unknown
1986	Westslope cutthroat		49,725		
	Kamloops (domestic)		158,625		
	Kamloops (wild)		24,335		
	Smallmouth bass		4,000		
1987	Westslope cutthroat		40,040		
	Kamloops (domestic)		316,839		
	Rainbow (Mt. Lassen)		50,000		
1988	Westslope cutthroat		89,461		
	Kamloops (domestic)	6,059			
1993	Westslope cutthroat		99,998		
	Kamloops/Steelhead		57,400		
	Kamloops (Black Canyon)		136,036		
1994	Westslope cutthroat		200,409		
	Kamloops (Trout Lodge)		271,285		
1995	Westslope cutthroat		100,732		
	Kamloops (domestic)		192,288		

The harvest of rainbow trout has compensated for the decline in cutthroat trout harvest and resulted in similar total trout harvest in 1982 and 1995. However, rainbow trout harvest does not appear to be maximized. The number and strain of rainbow trout stocked into Hayden Lake has varied. Catchable size (200-250 mm TL) rainbow trout were stocked from 1968 to 1976 (Table 7). No rainbow trout were stocked from 1977 to 1982. Fingerling size (75-150 mm TL) rainbow trout have been stocked since 1983. The number and strain of fingerling trout have been dependent on availability (Table 7). Size at stocking has varied from 75 to 150 mm TL. The stocking date has also varied from March to November. Most of the stocking took place in the spring or in the fall after water temperatures cooled.

Very few clipped rainbow trout were observed in the creel (Table 8). The estimated number of clipped rainbow trout harvested was 63, 31, and 11 for the May 1993, October 1993, and April 1994 stockings, respectively (Table 8). Estimated number of rainbow trout harvested does show a small downward trend in relation to time stocked. More rainbow trout from the first group stocked were caught than from the last group stocked (Table 8). This is not surprising as the first group stocked had more time in the lake to reach harvestable length and therefore were available to the angler for a longer period of time than the other groups.

These marked groups of rainbow trout will probably contribute to the fishery for several years. It is very difficult to determine if return to the creel of stocked fingerlings meets the minimum goal of 100% of the weight stocked returned to the creel. In 1994, 7,598 kg of rainbow trout were stocked into Hayden Lake. If we assume that the average weight of a rainbow trout harvested was 1.2 kg (based on 27 weights of harvested rainbow trout), 6,331 fish need to be harvested annually to meet the minimum goal. In 1994-1995, the estimated number of rainbow trout harvested was 1,632. This was only 26% of the minimum required to meet the guidelines.

Growth rates were different between the strains of rainbow trout stocked. Domestic Kamloops appeared to be the fastest growing group of rainbow trout (Table 9). Monthly growth increments averaged 21 mm, 13.2 mm, and 10.7 mm for the domestic Kamloops, Black Canyon Kamloops, and Kamloops/steelhead hybrids, respectively. There was no statistical difference between mean length of each group of rainbow trout when harvested due to the minimum length regulation of 330 mm (or 14 in). Sample groups were small and the results may be biased.

Scale samples from 23 harvested rainbow trout were read to determine ages. Age 2 rainbow trout dominated the group (n=17), followed by age 3 (n=5) and one age 5 fish. Mean lengths for age 2 and age 3 rainbow trout were 410 mm and 535 mm, respectively. The length ranges did not overlap.

Rearing conditions may affect survival of stocked trout. Most of the rainbow trout stocked into Hayden Lake prior to 1995 were raised in southern Idaho hatcheries, including the three groups of rainbow trout in this evaluation. The water there is "hard," or high in minerals. The hardness and conductivity values for inflow water at Nampa Fish Hatchery was 547 ppm and 778 micromohs. The hardness and alkalinity values at Niagra Springs Fish Hatchery was 234 ppm and 166 ppm, respectively. Hayden Lake is "soft" water, or low in minerals, with a conductivity of 40 micromohs, and hardness and alkalinity values of 20 ppm and 20 ppm, respectively. We have speculated that differences in water hardness may be contributing to the high mortality of stocked trout by affecting osmoregulation. However, there is no literature that supports or refutes this hypothesis at this time. The effect of water hardness may be compounding the stress induced by the 12- to 14-hour travel time from southern Idaho hatcheries. Our current solution is to raise the trout at Clark Fork Hatchery in northern Idaho, eliminating the water hardness problem and reducing hauling stress.

Table 8. Estimated harvest of each strain of rainbow trout stocked into Hayden Lake, Idaho, May 1993 - April 1994.

Date stocked	Species	Strain	Number stocked	Fin clip used	Estimated number returned	Percent returned	Estimated harvest
May 1993	Kamloops rainbow	Black Canyon	136,036	20,000 (LV)	63	0.0032	435
October 1993	Kamloops rainbow	Kamloops/ steelhead hybrid	57,400	20,000 (RV)	31	0.0016	92
April 1994	Kamloops rainbow	Trout Lodge	135,625	20,000 (AD)	11	0.0006	75

Table 9. Estimated growth per month for different strains of Kamloops rainbow trout stocked into Hayden Lake, Idaho, May 1993 - April 1994.

Date stocked	Strain	Mean length stocked	Mean length harvested	Growth increment (mm)	Number of months in lake	Growth per month (mm)
May 1993	Black Canyon	70	387	317	24	13.2
October 1993	Kamloops/ steelhead hybrid	178	381	203	19	10.7
April 1994	Trout Lodge	128	404	276	13	21

Angler Questionnaire - The third objective was to determine the attitude of anglers toward the management program on Hayden Lake. Hayden Lake is managed for quality trout, bass, and black crappie. Special regulations (Table 5) have been in place for a number of years. Two groups of people were surveyed; anglers and lake front property owners.

During the creel survey July 1 to November 30, 1994 and February 1 to June 30, 1995, 150 angler questionnaires were handed out and 53% (79) were returned. The majority of anglers supported the quality management program for Hayden Lake (Appendix B). A total of 75% of the responding anglers supported the quality regulations for crappie. A total of 72.6% of the responding anglers supported the quality management for bass (Appendix B). A total of 60.4% of the anglers supported the slot limit regulation, 28.3% preferred trophy management, and 28.3% preferred catch-and-release of bass. A total of 87% of the responding anglers (129) fished for trout. A total of 77.5% of the trout anglers supported the 14-inch minimum length regulation, 20% preferred trophy management, and 30% would support catch-and-release (Appendix B).

We mailed questionnaires to 999 lake front property owners and 33% (333) were returned. Only 44% (128) of the homeowners that responded fished Hayden Lake during the past 12 months. Fifty-eight percent of these anglers fished for crappie and 75% of these anglers supported quality management for crappie (Appendix A). A total of 71% of the homeowners fished for bass (Appendix A). Sixty percent supported quality management for bass, 28% preferred trophy management, and 28% supported catch-and-release for bass (Appendix A). Eighty-seven percent of the homeowners fished for trout on Hayden Lake. Seventy-seven percent supported quality management, 20% preferred trophy management, and 29.5% supported catch-and-release for trout (Appendix A).

Both the general public and lake front property owners who fished Hayden Lake supported the quality fishery management direction for Hayden Lake. There will be no major changes in the quality fishery management direction for trout and bass in the coming years.

Coeur d'Alene Lake

Creel Census - This is a summary of the current creel survey project for Coeur d'Alene Lake that began on July 1, 1995 and is scheduled to end June 30, 1996. The data summary is for the data collected from July 1 to December 31, 1995 and will be presented as monthly intervals. A more complete analysis will be included in the next Panhandle Region Management Report.

Anglers fished for an estimated 161,725 h on Coeur d'Alene Lake from July 1 to December 31, 1995 (Table 10). Eighty-nine percent of the fishing effort was directed toward chinook salmon (66%) and kokanee (23%). The Big One Chinook Derby has been a very popular derby with more than 1,000 participants annually. This nine-day derby contributed 26% of the total fishing effort on Coeur d'Alene Lake during the six-month survey period. It also contributed 40% of the total fishing effort for chinook salmon. In 1985 and 1986, anglers fished for an estimated 192,168 h and 172,452 h in the northern end of Coeur d'Alene Lake, respectively (Horner et al. 1986 and 1987). In 1985, fishing effort for kokanee (48%) and chinook salmon (41%) contributed 89% of the total effort similar to the overall effort for these two species in 1995. Warmwater and bank fishing effort contributed an estimated 11% of the total effort in 1995.

Table 10. Total fishing effort estimates (hours) by section, day type and method in Coeur d'Alene Lake, Idaho, for the period July 1, 1995 to December 31, 1995.

Section	Day type	Boat	Big One Derby	Bank	Total
1 - Northern section	Weekend	22,590	9,000	849	32,355
	Weekday	30,150	7,350	1,187	38,771
	Total	52,740	16,350	2,036	71,126
2 - Middle section	Weekend	12,756	5,400	165	18,321
	Weekday	12,692	3,900	0	16,592
	Total	25,448	9,300	165	34,913
3 - Southern section	Weekend	13,378	9,200	165	22,783
	Weekday	16,312	7,800	0	24,112
	Total	29,690	17,040	165	46,895
C - Chatcolet Lake	Weekend	2,742	--	450	3,192
	Weekday	2,498	--	0	2,498
	Total	5,240	--	450	5,690
B - Benewah Lake	Weekend	994	--	305	1,299
	Weekday	1,736	--	0	1,736
	Total	2,730	--	305	3;035
R - Round Lake	Weekend	66	--	0	66
	Weekday	0	--	0	0
	Total	66	--	0	66
All sections	Weekend	52,526	23,640	1,934	78,100
	Weekday	63,388	19,050	1,187	83,625
	Total	115,884	42,690	3,121	161,725

Anglers caught an estimated 54,941 fish from Coeur d'Alene Lake in 1995. Eighty-four percent of these fish were harvested (Table 11). Kokanee were the most abundant fish harvested at 42,315 (Table 11). Chinook salmon, the second most abundant fish caught, provided 7% of the fish caught and 5% of the fish harvested. Bass and northern pike were the next most abundant fish caught from Coeur d'Alene Lake (Table 11).

In 1985 and 1986, anglers expended a minimum of 89% of the total fishing effort for kokanee and chinook salmon which was similar to the fishing effort from July to December 1995 (Table 12). However, the amount of fishing effort for each species has changed. In 1985 and 1986, most of the effort was directed toward kokanee (Table 12). In 1995, anglers spent more time fishing for chinook salmon than for kokanee.

Kokanee and chinook salmon harvest showed the same trend as the fishing effort (Table 12). Anglers harvested an estimated 119,755 kokanee and 240 chinook salmon from the northern end of Coeur d'Alene Lake in 1985 (Horner et al. 1986). In 1986, anglers harvested an estimated 164,275 kokanee and only 76 chinook salmon. In 1995, anglers harvested an estimated 42,315 kokanee and 2,271 chinook salmon. The number of kokanee harvested has declined since 1985 even though the kokanee population is relatively high. The decline in harvest was probably due to a decline in fishing effort for kokanee. The 1985 and 1986 surveys included a very popular hand-line fishery for kokanee in May and June and may account for some of the decline in harvest. These months will be surveyed in 1996; however, in recent years this fishery has declined and the resulting harvest may not increase significantly. The mean length of harvested kokanee was between 210 mm and 240 mm and anglers seem to be pleased with the kokanee they catch, so desirability of kokanee does not seem to be a cause of the decline. The decline in kokanee harvest may be attributed to anglers switching from fishing for kokanee to fishing for chinook salmon.

Fish Population Characteristics

Coeur d'Alene Lake

Kokanee Population Abundance - The goal for the kokanee and chinook salmon management program on Coeur d'Alene Lake is to provide a high yield kokanee fishery and a limited trophy chinook salmon fishery. This will be achieved by establishing and maintaining a predator-prey balance between the kokanee and chinook salmon. Research indicates a balanced system will be achieved by attaining and maintaining a density of 50 age 3 and older kokanee/ha (Rieman and Myers 1990, Rieman and Maiolie 1995, and discussed in Horner et al. 1996b).

There are two main objectives of the program. The first is to assess kokanee population status, using abundance estimates, evaluation of changes in abundance due to chinook salmon predation, and predicting future kokanee fisheries based on year class strength and potential egg deposition. The second objective is to assess chinook salmon population status by determining relative abundance of hatchery and natural chinook salmon stocks and predicting the effect on kokanee abundance.

The key to the kokanee and chinook salmon management program on Coeur d'Alene Lake is the number of kokanee. As long as kokanee abundance is adequate to supply fish for the angler, forage for

Table 11. Estimated total number of fish caught, harvested and released by species, by section, and by day type from Coeur d'Alene Lake, Idaho, July 1, 1995 to December 31, 1995.

Sec[a]	Day type	Total hours	Total fish kept	Total fish rel	Total fish caught	Total chinook Kept	Total chinook Rel	Total kokanee Kept	Total kokanee Rel	Total cutthroat Kept	Total cutthroat Rel	Total largemouth bass Kept	Total largemouth bass Rel	Total smallmouth bass Kept	Total smallmouth bass Rel	Total northern pike Kept	Total northern pike Rel	Total other fish[b] Kept	Total other fish[b] Rel
1	We	32,355	9,277	1,454	10,731	514	523	8,084	217	8	16	7	121	15	23	161	74	70	192
	Wd	38,771	17,348	5,209	22,557	927	669	16,723	4,479	0	0	90	121	0	0	0	90	0	0
	Tot	71,126	26,625	6,663	33,288	1,441	1,192	24,807	4,696	8	16	97	242	15	23	161	164	70	192
2	We	18,321	6,280	155	6,435	155	91	6,631	0	13	0	13	0	0	0	13	38	0	26
	Wd	16,592	2,254	154	2,408	331	0	908	0	0	0	0	0	0	0	0	0	0	0
	Tot	34,913	8,534	309	8,843	486	91	1,074	0	13	0	13	0	0	0	13	38	0	26
3	We	22,783	6,615	226	6,841	172	241	6,275	54	0	0	0	54	0	0	0	9	0	18
	Wd	24,112	3,830	241	4,071	172	241	3,667	0	0	0	0	0	0	0	0	0	0	0
	Tot	46,895	10,445	467	10,912	344	482	9,942	54	0	0	0	54	0	0	0	9	0	18
C	We	3,192	450	656	1,106	0	0	27	0	0	0	119	548	0	0	55	6	233	122
	Wd	2,498	250	0	250	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Tot	5,690	700	656	1,356	0	0	27	0	0	0	119	548	0	0	55	6	233	122
B	We	1,299	61	481	542	0	0	0	0	0	0	0	425	0	20	0	0	12	21
	Wd	1,736	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Tot	3,035	61	481	542	0	0	0	0	0	0	0	425	0	20	0	0	12	21

LLTABS

Table 11. Continued.

Sec[a]	Day type	Total hours	Total fish kept	Total fish rel	Total fish caught	Total chinook Kept	Total chinook Rel	Total kokanee Kept	Total kokanee Rel	Total cutthroat Kept	Total cutthroat Rel	Total largemouth bass Kept	Total largemouth bass Rel	Total smallmouth bass Kept	Total smallmouth bass Rel	Total northern pike Kept	Total northern pike Rel	Total other fish[b] Kept	Total other fish[b] Rel
R	We	66	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Wd	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Tot	66	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tot	We	78,016	22,683	2,972	25,655	841	855	21,017	271	21	16	139	1,148	15	43	229	127	315	379
	Wd	83,709	23,682	5,604	29,286	1,430	910	21,298	4,479	0	0	90	121	0	0	0	90	0	0
	Tot	161,725	46,365	8,576	54,941	2,271	1,765	42,315	4,750	21	16	229	1,269	15	43	229	217	315	379

[a] Section 1 is the northern end south to Arrow Point.
Section 2 is the middle from Arrow Point south to East Point.
Section 3 is the southern end from East Point south to the train tressle at Chatcolet Lake.
Section C is Chatcolet Lake.
Section B is Benewah Lake.
Section R is Round Lake (Benewah County).

[b] Other fish include black crappie, channel catfish, brown bullheads, yellow perch, sunfish, and nongame fish.

Table 12. Comparison of estimated fishing effort and harvest of kokanee and chinook salmon from Coeur d'Alene Lake, Idaho, 1985, 1986 and 1995.

	1985[a]	1986[b]	1995
Estimated total fishing effort (h)	192,200	172,452	161,725
Estimated fishing effort for chinook	79,955 (41%)	37,800 (23%)	106,739 (66%)
Estimated fishing effort for kokanee	93,833 (48%)	134,652 (78%)	37,197 (23%)
Estimated harvest of chinook	240	76	2,271
Estimated harvest of kokanee	119,755	164,275	42,315

[a] Estimates were for the northern end of Coeur d'Alene Lake, April 27 to November 30, 1985.

[b] Estimates were for kokanee and chinook salmon only for the northern end of Coeur d'Alene Lake, April 27 to October 30, 1986.

chinook salmon and other predators in the lake, and satisfy recruitment needs, the management program is working. The goal is to produce the best kokanee and chinook salmon fishery possible within the ecological constraints of the Coeur d'Alene Lake system.

We trawl Coeur d'Alene Lake every year to estimate kokanee abundance. In 1995, the estimated total number of kokanee in Coeur d'Alene Lake was 8.37 million (Table 13). The high number was due to the abundance of age 2 and age 3 kokanee (Table 13). The 1991 and 1992 year classes of kokanee were very strong. The strong 1991 year class of kokanee was attributed to the higher than average egg deposition in 1991 of 167 million (average 143 million) and a warmer than average spring in 1992 which may have increased fry survival (Table 14). The strong 1992 year class of kokanee was probably due to the highest egg deposition recorded (198 million eggs) (Table 14). Age 1 kokanee abundance was an estimated 0.62 million (Table 13). This estimate was lower than the 10-year average (excluding 1994 estimate of 1 year old kokanee) of 2.17 million. The 1995 estimate was similar to the estimates from 1989 to 1992 (Table 13). These low age 1 estimates may have resulted from avoidance of kokanee to high densities of chinook salmon and the kokanee were not vulnerable to the trawl. There have been increases in age 2 kokanee the following years (Table 13). Trawling in 1996 will provide a better estimate of the 1993 year class of kokanee.

The large number of age 3 and older kokanee in 1995 has produced the highest potential egg deposition ever; 446 million eggs (mean length of male kokanee was 251 mm, mean length of female kokanee was 240 mm, and the estimated number of eggs per female was 313). Mean length of age 3 and older kokanee has remained relatively stable for the past few years (Figure 8).

The density of age 3 and older kokanee was 295 fish/ha in 1995 (Table 15). We attained the desired density of 50 age 3 and older kokanee/ha in 1993 as a result of construction of Interstate 90 that buried kokanee eggs still in the gravel and in 1994. The 14-year (1979-1993) mean density for age 3 and older kokanee/ha is 106. The more recent 5-year (1989-1993) average is 104 fish/ha.

Chinook Salmon Abundance - The number of chinook salmon in the lake in the past appears to have been inadequate to reach our desired goal for kokanee density. In 1993, we increased the number of age 0 chinook salmon entering the lake annually to 72,000 by stocking 30,000 hatchery-raised chinook salmon fingerlings and allowing the production of 42,000 natural chinook salmon (105 redds, at 4,000 eggs/redd, 10% survival from egg to fingerling) in tributaries of Coeur d'Alene Lake. A total of 30,198 age 0 hatchery chinook salmon was stocked on June 26, 1995 into Wolf Lodge Bay (Table 16).

In 1995, the chinook salmon egg take was approximately 109,000 eggs. The stocking recommendation was increased to 50,000 fingerlings in 1996 due to the anticipated loss of natural chinook salmon production from winter flooding in the tributary streams. One hundred thirty adult chinook salmon were trapped in the Wolf Lodge Creek weir between September 5 and October 14, 1995. Hatchery personnel spawned 35 females and 45 males. Hatchery chinook salmon comprised 25% of the fish trapped, and natural fish comprised 75% (Table 17).

Most of the natural chinook salmon reproduction occurred in the Coeur d'Alene River system. Department personnel counted 64 redds in the Coeur d'Alene River system and 1 in the St. Joe River in 1995 (Table 18). The number of redds counted was below the desired level of 105. The low number of redds can be attributed to the low number of redds in 1991 (Table 18) which produced the 3-year-old chinook in 1995. Three-year-old chinook were the most abundant group of spawning hatchery fish and

Table 13. Estimates of the abundance of kokanee by year-class (1977-1994) made by midwater trawl in Coeur d'Alene Lake, Idaho, 1980-1995. Estimates are in millions of kokanee.

Year class[a]	1995	1994	1993	1992	1991	1990	1989	1988	1987	1986	1985	1984	1983	1982	1981	1980
1994	2.00															
1993	0.62	5.95														
1992	2.90	5.40	5.57													
1991	2.85	4.90	5.23	3.02												
1990		0.50	1.42	0.81	4.86											
1989			.48	0.51	0.54	3.00										
1988				0.98	1.82	0.59	3.04									
1987					1.28	2.48	0.75	3.42								
1986						1.32	3.95	3.06	6.88							
1985							0.94	2.81	2.38	2.17						
1984								0.61	2.92	2.59	4.13					
1983									0.89	1.83	0.86	0.70				
1982										0.72	1.86	1.17	1.51			
1981											2.53	1.89	1.91	4.53		
1980												0.80	1.25	2.36	2.43	
1979													0.81	1.38	1.75	1.86
1978													0.93	1.71	1.68	1.50
1977													.	1.06	1.95	2.29
Total	8.37	12.6	12.70	5.32	8.50	7.39	8.68	10.90	13.07	7.31	9.37	4.56	6.48	9.20	6.94	6.50
Total age 1 and older	6.37	10.8	7.13	2.30	3.64	4.39	5.64	7.48	6.19	5.14	5.24	3.86	4.97	4.67	4.51	4.69
No/ha	866	1,306	1,316	551	881	766	900	1,123	1,353	757	970	472	671	953	719	678

[a]Year eggs were deposited.

Table 14. Estimates of female kokanee spawning escapement, potential egg deposition, fall abundance of kokanee fry, and their subsequent survival rates in Coeur d'Alene Lake, Idaho, 1979-1995.

Year	Estimated female spawning escapment	Estimated potential number of eggs ($x10^6$)	Fall fry estimate the following year ($x10^6$)	Percent survival from egg deposition to fall fry
1979	256,716	86	1.86	2.20
1980	501,492	168	2.43	1.45
1981	550,000	184	4.54	2.46
1982	358,200	120	1.51	1.25
1983	441,376	99	0.70	0.71
1984	316,829	106	4.13	3.90
1985	530,631	167	2.17	1.29
1986	368,633	103	6.89	6.68
1987	377,746	126	3.42	2.71
1988	362,000	119	3.04	2.55
1989	516,845	155	3.00	1.94
1990	657,777	204	4.86	1.96
1991	631,500	167	3.03	1.81
1992	488,438	198	5.57	2.81
1993	240,000	92	5.95	6.46
1994	250,000	64	2.0	0.31
1995	1,425,000	446	--	--

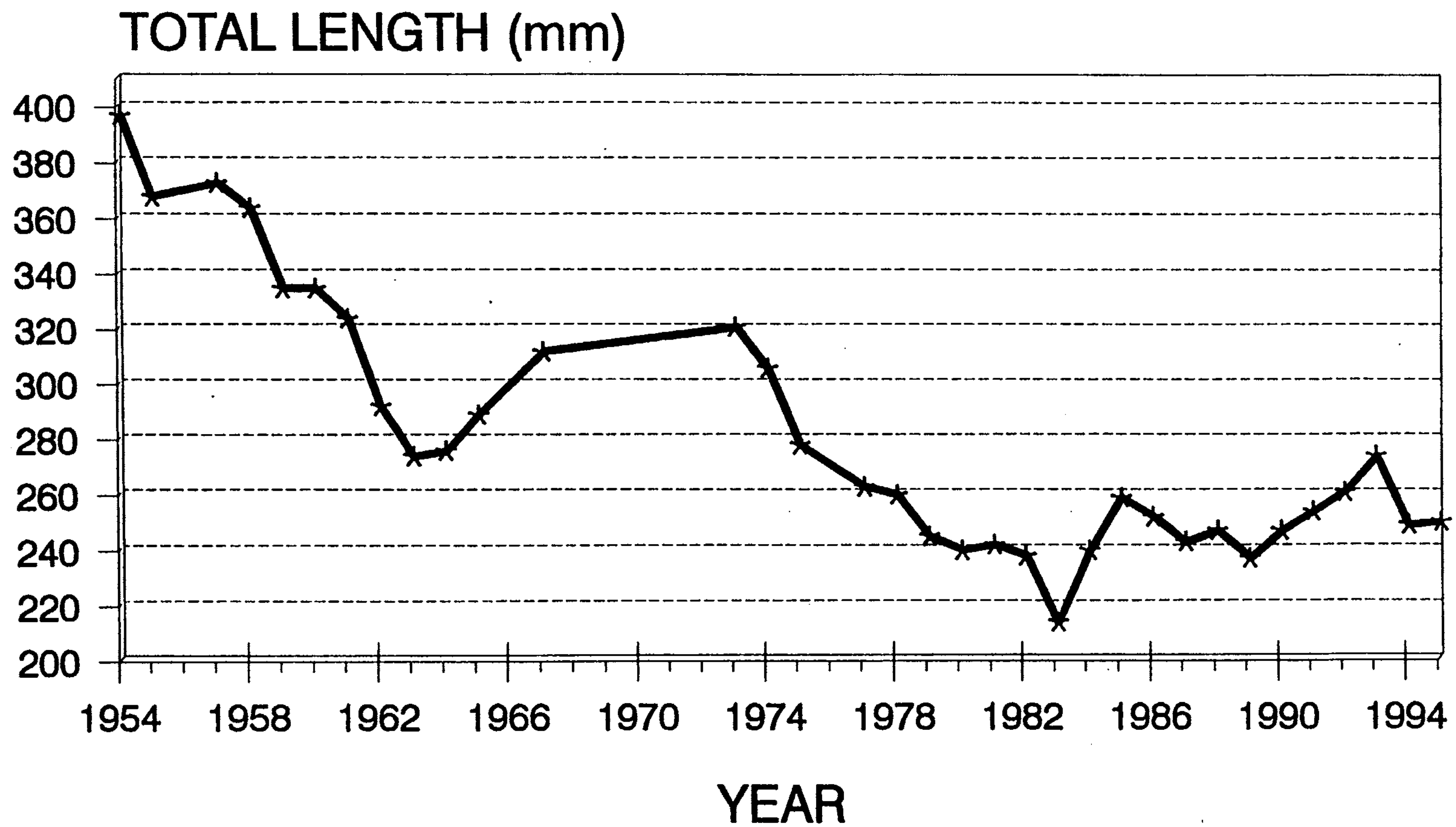

Figure 8. Mean length (mm) of male and female kokanee spawners in Coeur d'Alene Lake, Idaho, 1954-1995.

Table 15. Kokanee density (fish/ha) estimates for each age class in each section of Coeur d'Alene Lake, Idaho, July 23 - 26, 1995.

Section	Age 0	Age 1	Age 2	Age 3	Total
1	833	47	161	143	1,184
2	35	50	345	361	791
3	5	132	326	265	728
Whole lake	206	64	301	295	866

Table 16. Number, weight and lengths of fall chinook salmon released into Coeur d'Alene Lake, Idaho, 1982-1995.

Release date	Release site	Number released	Weight released (kg)	Length (mm) mean	Length (mm) Range	Rearing hatchery	Stock of fish	Mark
07-19-82	MR[a]	28,700	767	137	125-150	Hagerman	Bonneville	None
10-05-82	I-90	5,700	273	150	130-170	Hagerman	Bonneville	None
Total 82		34,400	1,040					
08-09-83	I-90	30,100	289	109	80-130	Mackay	Bonneville	None
10-26-83	I-90	30,000	637	124	80-150	Mackay	Bonneville	None
Total 83		60,100	926					
10-29-84	I-90	10,500	373	150	80-190	Mackay & Mullan	Lake Michigan	None
10-16-85	I-90	11,100	409	136	--	Mackay & Mullan	Lake Michigan	Left ventral
10-17-85	I-90	7,400	273	143	--	Mackay & Mullan	Lake Michigan	Adipose
Total 85		18,500	682					
07-02-86	I-90	29,500	375	114	81-145	Mackay	Lake Michigan	Right ventral
07-01-87	I-90	59,400	900	119	62-155	Mackay	Lake Michigan	Adipose
07-16-88	I-90	44,600	977	133	95-180	Mackay	Lake Coeur d'Alene	Left ventral
07-06-89	I-90	35,000	636	126	100-165	Mackay	Lake Coeur d'Alene	Right ventral
07-10-90	MR	35,700	626	123	80-145	Mackay	Lake Coeur d'Alene	Adipose
07-10-90	MR	650[b]	11	123	80-145	Mackay	Lake Coeur d'Alene	Ad/right vent
Total 90		36,350	637					
07-09-91	MR	41,600	750	129	75-151	Mackay	Lake Coeur d'Alene	Left ventral
07-09-91	MR	1,050[b]	16	129	75-151	Mackay	Lake Coeur d'Alene	Ad/Left vent
Total 91		42,650	766					
07-07-92	MR	10,000	500	132	115-150	Mackay	Lake Coeur d'Alene	Right ventral
1993		0					No hatchery chinook were stocked in 1993	
06-06-94	I-90	17,267	910	134	110-180	Nampa	Lake Coeur d'Alene	Adipose
06-26-95	I-90	30,198	1,050	124	90-145	Nampa	Lake Coeur d'Alene	Left ventral

[a] MR = Mineral Ridge boat ramp.
[b] Sterile triploid fish from heat-shocked eggs.

Table 17. The number and percent of hatchery and wild chinook salmon trapped in Wolf Lodge Creek, Coeur d'Alene Lake, Idaho, 1984-1995.

		Natural fish trapped						Hatchery fish trapped								
		M		F		Total		M		F		Total		Year hatchery fish stocked	Age when trapped	Fin clip
Year trapped		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%			
1984		No natural fish return yet						22	63	13	37	35	100	1982	2	--
1985		No natural fish return yet						--	--	--	--	--	--	1982	3	--
1986		Unknown natural run, hatchery fish not clipped						19	41	27	59	46	100	1983	3	--
1987		3 year old fish from 1984 release were not marked						27	79	7	21	34	100	1984	3	--
														1985	2	AD & LV
1988		3 year old fish from 1984 release were not marked						15	29	37	71	52	--	1985	3	AD
								3	100	0	0	3	--	1985	3	LV
								5	83	1	17	6	--	1986	2	RV
	Total	25	56	20	44	45	42	23	38	62	61	58				
1989								3	33	6	67	9	--	1986	3	RV
								46	64	26	36	72	--	1987	2	AD
	Total	22	42	31	58	53	40	49	60	32	40	81	60			
1990								16	28	43	72	59	--	1987	3	AD
								23	80	5	20	28	--	1988	2	LV
	Total	40	46	43	54	83	49	39	44	48	56	87	51			
1991								1	14	6	86	7	--	1987	4	AD
								41	41	60	59	101	--	1988	3	LV
								64	61	41	39	105	--	1989	2	RV
	Total	50	60	34	40	84	28	106	50	107	50	213	72			
1992								2	40	3	60	5	--	1988	4	LV
								33	39	51	61	84	--	1989	3	RV
								22	88	3	12	25	--	1990	2	AD
	Total	36	52	33	48	69	37	57	50	57	50	114				

Table 17. Continued.

Year		Natural fish trapped						Hatchery fish trapped						Year hatchery fish stocked	Age when trapped	Fin clip
		M		F		Total		M		F		Total				
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%			
1993								1	50	1	50	2	--	1989	4	RV
								18	46	21	54	39	--	1990	3	AD
								3	75	1	25	4	--	1991	2	LV
	Total	6	46	7	54	13	22	22	48	23	52	45	78			
1994								8	5	14	9	22	--	1990	4	AD
								24	16	49	32	73	--	1991	3	LV
								10	7	4	3	14	--	1992	2	RV
	Total	29	19	15	10	44	29	42	28	67	44	109	72			
1995								9	75	3	25	12		1991	4	LV
								14	67	7	33	21		1992	3	RV
	TOTAL	66	68	31	32	97	75	23	70	10	30	33	25			

Table 18. Counts of fall chinook salmon redds in the Coeur d'Alene and St. Joe rivers, Lake and Fighting creeks, Coeur d'Alene Lake, Idaho, 1989-1995.

	Survey Date						
Location	9/29/89	11/1/90	10/31/91	10/20/92	10/18/93	10/10/94	10/04/95
Coeur d'Alene River							
Cataldo Mission to S.F. Cd'A River	--	41	11	29	80	82	45
S.F. Cd'A River to L.N.F. Cd'A River	--	10	0	5	11	14	14
L.N.F. Cd'A River to Steamboat Creek	--	--	2	3	6	1	1
Steamboat Creek to steel bridge	--	--	--	1	0	0	2
Subtotal	52	55	13	38	97	97	62
South Fork Coeur d'Alene River	--	--	--	--	--	13	--
Little North Fork Coeur d'Alene River	--	--	--	--	--	0	2
St. Joe River							
St. Joe City to Calder	--	4	0	18	20	6	1
Calder to Huckleberry CG	--	3	1	1	4	0	0
Huckleberry CG to Marble Cr.	--	3	0	2	0	1	0
Marble Creek to Avery	--	0	0	0	0	1	0
Subtotal	0	10	1	21	24	8	1
Lake Creek	--	5	--	3	--	--	--
Fighting Creek	--	0	--	1	--	--	--
GRAND TOTAL	52	70	14	63	121	118	65

natural fish in the 1995 spawning run into Wolf Lodge Creek (Figure 9). Age 3 chinook salmon were probably the most abundant age group in the Coeur d'Alene River spawning run. Two large rain-on-snow events in December 1995 and February 1996 caused major flooding and may have reduced the number of natural chinook salmon produced. Hatchery stocking will be increased in 1996 to compensate for the lower number of natural chinook salmon. The number of chinook redds should be at the desired level when the 1995 year class matures and spawns.

Four chinook salmon derbies were held in 1995; April 8-9, June 17-18, August 11-20, and December 9-10. Anglers expended an estimated 60,070 h of effort during the four derbies (Table 19). An estimated 1,340 chinook salmon were caught and 717 were harvested during these four derbies (Table 19). Natural chinook salmon comprised the majority of chinook harvested.

Eight members of the Lake Coeur d'Alene Anglers Association (chinook salmon club) returned angler diaries for 1995. They fished for a combined total of 4,088 h, caught 751 chinook salmon for a catch rate of 5 h/fish (Table 20). Individual catch rates ranged from 2 h/fish to 56.5 h/fish. Hatchery chinook salmon comprised 2% of the catch.

The low number of hatchery chinook salmon in the catch is related to reduction in stocking. Only 10,000 chinook salmon were stocked in 1992, and no chinook salmon were stocked in 1993. The number of hatchery chinook salmon in the creel should begin to increase with the 1994 group of chinook entering the fishery as 2-year-olds in 1996.

Pend Oreille Lake

<u>**Kokanee Abundance**</u> - Midwater trawl estimates of kokanee abundance in Pend Oreille Lake in 1995, as reported by Maiolie and Elam in Kokanee Impacts Assessment and Monitoring on Pend Oreille Lake, Idaho (in progress), was 9,990,000 for all age class fish. Density estimates for age 4/5+ kokanee in 1995 was 8.52/ha. Number of kokanee per age class and potential egg deposition for 1977-1995 in Pend Oreille Lake are given in Table 21. Hydroacoustic equipment (Maiolie and Elam 1994) was operated from the trawler at the same time the net was in the water trawling for kokanee salmon. The estimate of kokanee salmon derived from the Hydroacoustic survey was 12,770,497 (90 % C.I. +/- 1,313,994) for all age classes of kokanee and 6,347,854 (90 % C.I. +/- 840,959) for age 1+ to age 5+. This estimate is valid only for the number of kokanee salmon present in the depth strata sampled by the midwater trawl.

Spirit Lake

<u>**Kokanee Abundance**</u> - Midwater trawl estimates of kokanee abundance in Spirit Lake in 1995 was 281,086 fish for all age classes (Table 22). The 1995 population estimate is a 74% increase from the 1994 Spirit Lake kokanee population estimate. Abundance estimates by age for 1995 were: 39,852 age 0+, 129,350 age 1+, 30,461 age 2+, 73,282 age 3+, and 8,141 age 4+ fish. The density estimate for age for all age classes of kokanee in Spirit Lake in 1995 was 480 fish/ha. The density estimate for age 2+ and older kokanee (fish recruited to angler gear) was 191 fish/ha.

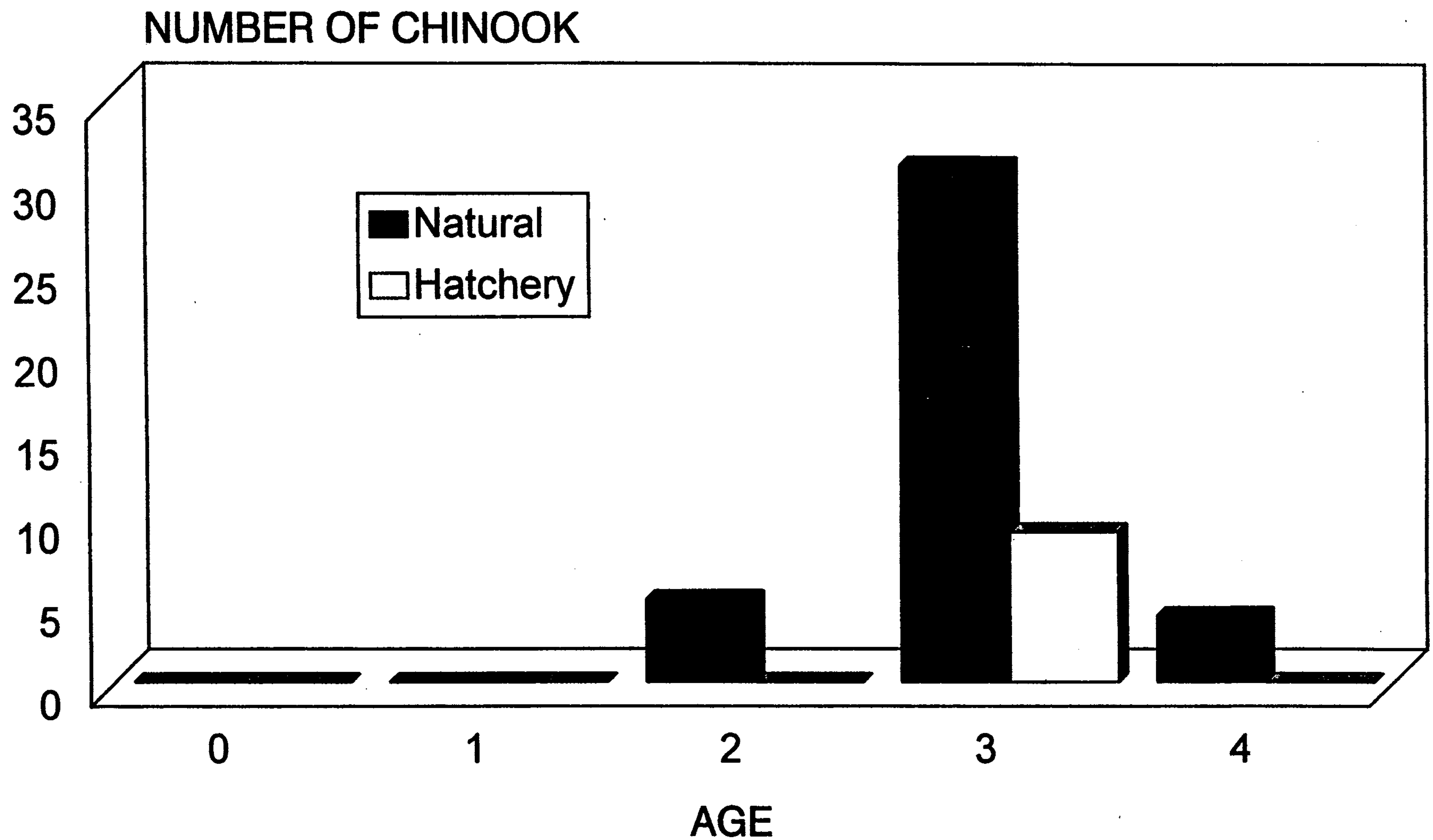

Figure 9. Age frequency of hatchery and natural chinook salmon collected in the Wolf Lodge Creek weir, Coeur d'Alene Lake, Idaho, 1995.

Table 19. Chinook salmon derby creel survey results, Coeur d'Alene Lake, Idaho, 1995.

Date	Number of anglers interviewed	Estimated hours fished	Estimated chinook caught	Estimated chinook harvested	Estimated chinook released	Catch rate (hours/fish)
April	55	4,268	90	73	17	47
June	154	5,937	320	172	148	19
August	508	48,305	784	388	396	62
December	98	1,560	146	84	62	11
Total	815	60,070	1,340	717	623	--

Table 20. Summary of eight chinook salmon angler diaries from Coeur d'Alene Lake, Idaho, 1995.

Angler	Number of hours	Number chinook kept	Number chinook released	Total chinook caught	Number hatchery chinook	Catch rate (fish/h)
1	502.8	35	120	155	5	3.2
2	261	14	29	43	0	6.1
3	494	20	14	34	0	14.5
4	338	26	41	65	1	5.2
5	315.5	25	10	35	1	9.0
6	1,391	69	83	152	5	9.0
7	226	2	2	4	0	56.5
8	560	64	197	261	0	2.0
Total	4,088.3	255	496	751	12	5.0

Table 21. Estimated potential egg deposition (PED), hatchery egg take (hatchery egg numbers are included in PED), and estimated abundance (millions) of kokanee salmon made by midwater trawl in Pend Oreille Lake, Idaho, for 1977-1995. To follow a particular year class of kokanee salmon, read up one row and right on column.

Sampling Year	PED	Hatchery egg take	Age class 0+	1+	2+	3+	4+	5+	Total	Density 4/5+ (N/ha)
1995	74.7	12.8	4.55	2.87	1.52	0.74	0.15	0.04	9.88	8.4
1994	246.0	16.6	6.76	0.38	0.70	0.99	0.76	0.07	9.68	36.9
1993	218.5	11.1	3.17	1.48	1.30	2.00	1.02		8.97	45.1
1992	145.2	7.5	4.55	1.33	0.78	1.11	0.64		8.41	28.3
1991	92.9	6.6	1.98	0.83	1.77	0.77	0.27		5.62	11.9
1990	63.9	6.0	3.35	1.59	1.45	0.33	0.20		6.93	8.8
1989	117.6	9.6	4.48	1.17	1.20	0.45	0.37	0.04	7.71	18.1
1988	118.3	14.1	7.31	1.66	0.51	0.38	0.35		10.21	15.5
1987	116.3	17.2	3.55	0.78	0.84	0.43	0.42		6.02	18.6
1986	68.6	9.1	1.66	1.15	0.68	0.54	0.24		4.26	10.6
1985	122.5	10.7	1.79	1.03	1.24	0.37	[a]	[a]	4.47	[a]
1984	88.4	15.0	2.63	1.51	1.21	0.28	[a]	[a]	5.62	[a]
1983	34.2	6.3	2.14	2.28	0.50	0.29	[a]	[a]	5.21	[a]
1982	21.7	11.4	3.84	2.77	0.64	0.87	[a]	[a]	8.12	[a]
1981	41.0	11.6	2.31	1.36	0.79	0.74	[a]	[a]	5.20	[a]
1980	181.1	4.2	1.69	1.00	0.96	1.03	[a]	[a]	4.68	[a]
1979	119.4	1.4	2.01	1.31	1.70	0.67	[a]	[a]	5.69	[a]
1978	197.7	1.5	1.82	0.71	2.00	1.29	[a]	[a]	5.82	[a]
1977	117.1	2.4	2.01	1.17	2.95	0.65	[a]	[a]	6.78	[a]

[a] Age 3+ and 4+ kokanee salmon were not separated through aging prior to 1986.

Table 22. Estimates of kokanee salmon year classes (1977-1994) made by midwater trawling in Spirit Lake, Idaho, 1981-1995. Estimates are in thousands of kokanee salmon. Estimates from 1981 and 1982 were derived from hand calculation as opposed to later data that was generated from a Lotus computer program (Rieman 1992).

	Year estimated														
Year class	1995[a]	1994[a]	1993	1992[b]	1991	1990	1989	1988	1987	1986	1985	1984	1983	1982	1981
1994	39.8														
1993	129.4	11.8[c]													
1992	30.5	76.3	52.4												
1991	73.3	81.7	244.1	--											
1990	8.1	19.6	114.4	--	458.4										
1989			11.5	--	215.6	110.0									
1988				--	90.0	285.8	111.9								
1987					26.0	84.1	116.4	63.8[d]							
1986						62.0	196.0	207.7	42.8[e]						
1985							86.0	78.5	164.8	15.4[f]					
1984								148.8	332.8	138.0	149.6[g]				
1983									71.7	116.8	184.9	3.3[h]			
1982										35.4	101.0	16.4	111.2		
1981											66.6	148.8	224.0	526.0	
1980												96.5	111.2	209.0	281.3
1979													39.2	57.7	73.4
1978														48.0	82.1
1977															92.6
Age I-IV	241.3	177.6	370.0	--	331.6	431.8	398.5	435.0	569.3	290.2	352.5	261.6	374.5	314.7	248.1
Totals	281.1	189.4	422.4	--	790.0	541.8	510.4	498.8	612.1	305.6	502.1	264.9	485.7	840.7	529.4

[a] South Idaho trawler used in 1994 and 1995, north Idaho trawler used all other years.
[b] No trawling conducted in 1992 due to low lake level and inability to launch north Idaho trawler.
[c] 383,550 kokanee fry released in 1994.
[d] 75,000 kokanee fry released in 1988.
[e] 60,800 kokanee fry released in 1987.
[f] 57,142 kokanee fry released in 1986
[g] 109,931 kokanee fry released in 1985.
[h] 100,000 kokanee fry released in 1984.

Priest Lake and Upper Priest Lake - Lake Trout Abundance

Hydroacoustic Surveys

Priest Lake - The Simrad Hydroacoustic estimate of fish abundance in Priest Lake in 1995 was 85,086 for all size fish. Analysis of the dB frequency provided abundance estimates for each size class fish, but different fish species can not be separated by target strength (Appendix H). For fish between 76 mm and 330 mm the estimate was 61,369 fish in Priest Lake. The abundance estimate was 9,095 fish for the 330 mm to 460 mm range, 7,298 for fish in the 460 mm to 660 mm range, and 8,338 for fish larger than 660 mm (Table 23).

Lake trout in Priest Lake recruit to angler gear at about 330 mm. Assuming all sonar readings of -35 dB or greater (330 mm or larger fish) were lake trout, an estimated 24,732 catchable size lake trout were in Priest Lake in 1995 (+/- 11,746 fish at CI=95%) (Table 23). This would equate to an exploitation rate of 57% for the 1994 estimated harvest of 13,987 lake trout (Horner et al. 1997). The confidence intervals surrounding these estimates could increase substantially if the analysis had treated each transect independent of another rather than lumping all transects together.

Upper Priest Lake - While a population estimate of fish was not made for Upper Priest Lake, hydroacoustic data did provide an idea of the relative abundance of the various size classes of fish in the upper lake (Table 23). The three transects that were initially selected for Upper Priest Lake, 47-46, 48-49, and 51-52 (Figure 4, Appendix D) provided insufficient data to make any fish abundance estimates for the lake. A fourth transect (54-45) that ran most of the length of the lake, from the inlet south to near the outlet (Figure 4), did record significant numbers of fish. This transect was not usable in the statistical analysis because it bisected all three of the other transects. The frequency of readings in the fourth transect of fish greater than -50 dB or larger than 76 mm in length was 359 fish/ha. The frequency of readings greater than -38 dB or fish longer than 330 mm was 25.13 fish/ha. This information indicates that most of the biomass in Upper Priest Lake consists of fish less than 330 mm in length. Considering the diversity of fish in the upper lake, these readings would be of pigmy whitefish *Prosopium coulteri* and mountain whitefish *Prosopium williamsoni*, westslope cutthroat trout, kokanee salmon, longnose sucker *Catostomus catostomus*, or longnose dace *Rhinichthys cataractae*. As stated previously, these estimates are not indicative of Upper Priest Lake as a whole but rather the one transect, 54-45, only. More information is needed to be able to provide abundance estimates for Upper Priest Lake.

A Note on Hydroacoustic Surveys - The hydroacoustic estimates of fish abundance in Priest Lake and fish densities in Upper Priest Lake should be viewed with care. The use of the Simrad EY500 for estimating sport fish populations is still in the development stage. The rating curve for equating dB levels to fish size is unproven for lake trout and other freshwater species of fish. Because of the curvilinear relationship between dB level and fish size, a slight variation in the dB return signal can result in a pronounced difference in the estimated size of the target fish. The estimated numbers of lake trout in the three size classes does not correspond well with the length frequency of harvested fish. Further refinement of the survey methodology and the dB to fish length relationship should improve the estimates. Until then, the hydroacoustic estimates are best used in conjunction with data collected with conventional sampling methodologies.

Table 23. Simrad hydroacoustic readings for Priest and Upper Priest lakes, Idaho, July 10-12, 1995. Estimates of fish abundance, by size class, are presented for Priest Lake.

	Fish/ha or frequency of dB readings (length range) / transect				
Priest Lk transect #	-50 dB>-35 dB (76-330 mm)	-35 dB>-32 dB (330-460 mm)	-32 dB>-29dB (460-660 mm)	-29dB > (>660 mm)	$\sum$ -35 dB > (>330 mm)
1 > 2	7.37	0.00	3.63	0.00	3.63
4 > 5	0.00	0.00	0.00	4.00	4.00
7 > 6	4.74	0.54	0.30	0.42	1.26
9 > 13	21.75	3.48	2.32	1.45	7.25
17 > 16	0.66	0.44	0.00	0.00	0.44
18 > 19	0.66	0.00	0.00	1.32	1.32
15 > 21	10.35	2.55	1.20	0.75	4.50
22 > 23	10.80	2.40	1.20	0.60	4.20
24 > 27	9.00	1.50	1.95	2.55	6.00
28 > 29	2.16	1.80	0.00	0.72	2.52
31 > 30	4.00	0.00	0.00	0.00	0.00
34 > 33	13.60	0.80	0.80	0.80	2.40
35 > 36	2.28	0.42	0.18	0.12	0.72
37 > 38	1.00	0.50	0.00	0.50	1.00
39 > 40	9.00	0.00	0.00	0.00	0.00
$\sum_{transects}$	97.37	14.43	11.58	13.23	39.24
$\bar{x}_{transects}$	6.49	0.96	0.77	2.62	2.62
$s_x =$	6.07	1.12	1.10	1.10	2.24
SE =	14,822.90	2,731.70	2,694.96	2,705.66	5463.33
$\sqrt{v_t} =$	57,408.86	10,579.81	10,437.53	10,478.98	21,159.40
$\hat{N} =$	61,369	9,095	7,298	8,338	24,732
$B_{t(90\%)} =$	± 26,088	± 4,808	± 4,734	± 4,762	± 9,615
$B_{t(95\%)} =$	± 31,869	± 5,873	± 5,794	± 5,817	± 11,746
[a]Upper Priest Lk transect #	-50 dB>-35 dB	-35 dB>-32 dB	-32 dB>-29dB	-29dB>	$\sum$ -38 dB >
47 > 46	0.00	0.00	0.00	0.00	0.00
48 > 49	20.00	0.00	0.00	20.00	0.00
51 > 52	64.00	0.00	0.00	64.00	0.00
54 > 45	341.05	3.59	0.00	14.36	17.95

$\bar{x}_i = \sum x/n$
SE = $s/\sqrt{n}$
$V_t = V_{xi} A^2$

where: n = the number of transects.
$\hat{N}$ = population estimate = $\bar{x}$ (A).
A = surface area of Priest Lake = 9,454 ha and Upper Priest Lake = 567 ha.
$B_{t(90\%)\ or\ (95\%)} = t\sqrt{v_t}$ = bounds around the population estimate at 90% and 95% CI
$t_{df=14} = 1.76$ for 90%
$t_{df=14} = 2.15$ for 95%

[a]Fish abundance estimates were not made for Upper Priest Lake due to insuficient data.

Lake Trout Floy Tagging

Priest Lake - In 1995, from August 13 to October 24, 245 lake trout were caught in Priest Lake with rod-and-reel, measured, weighed, tagged with a numbered floy tag, and released back into the lake at the capture site. Volunteer angling effort accounted for 229 of the 245 lake trout tagged. Of the 245 tags, 39 were non-reward tags (yellow, series R1-01251 to R1-01255 and R1-01275 to R1-01308), the remaining 208 were $10.00 reward tags (blue, R1-001 to R1-196 and R1-201 to R1-212). Most of the tagged fish (184 reward tags and 30 non-reward tags) were captured off the northeast point of Bartoo Island and the northeast side of Bartoo Island (Figure 4) (in the vicinity of GPS point 15). The west side of Eightmile Island was the second greatest concentration where 16 reward tags were released. The average length of fish in the tagging sample was approximately 455 mm. The length of fish in the sample ranged from 279 mm to 673 mm. Approximately 32% of the tagged fish (78 out of the 245) were "fizzed" to aid in their return to deep water. The use of the "fizzing" technique will be evaluated through tag returns of "fizzed" fish versus "non-fizzed" fish. Greater use of the "weighted lake trout return tool" will be encouraged in future tagging efforts rather than the "fizzing" technique to send fish back to deep water.

Three floy tags were returned by anglers in 1995. One tag was from a 572 mm fish that was initially tagged on September 8, 1995, south of the mouth of Bear Creek approximately 1.5 km. Recapture occurred ten days later on September 18, 1995. The reported recapture site was Cavanaugh Bay, approximately 10 km south of the tagging site. This type of movement by lake trout in Priest Lake has not been found from other tag returns in previous years. It is possible that the recapture site was misidentified. The other two floy tags returned in 1995 were from fish tagged in 1988 and 1990. The return of one tag from the 245 lake trout tagged in 1995 indicates an extremely low exploitation rate (0.4%) of lake trout in Priest Lake. From earlier tagging studies conducted with lake trout in Priest Lake, virtually no tags were returned the same years that fish were tagged. In fact, marked fish have been recaptured up to 11 years after tagging. The average time between tagging and recapture has been 3.6 years. With this past trend, it is not altogether unexpected that only 1 tag, from the 245 released, was returned in 1995. What is unexpected is that with more than 87% of the tagged fish released in an area less than 0.5 km^2, that the one recapture came from an area where only two fish were caught and tagged. Tag returns, from previous tagging studies, have shown very little movement of marked fish from the area of tagging.

Lake trout tagging will continue in 1996. Tag return boxes will be stationed in the Priest Lake and Priest River area to simplify the return of the tags. Local news releases and fliers posted around the lake, describing the tagging operation, will increase the return rate of recaptured tags. With continued monitoring of the tag returns a better estimate of lake trout exploitation can be made.

Lake Surveys

Swan, Black, and Rose Lakes

Swan and Black lakes are connected to the Coeur d'Alene River via small channels that allow access for anglers by boat. Rose Lake is connected to the river by a small outlet stream. There is no boat access through this stream. Swan and Black lakes are directly affected by the river, especially during spring runoff and rain-on-snow events. Swan, Black, and Rose lakes have the same basic fish species composition (Table 24). The only difference is Rose Lake has bluegill, which were originally stocked in 1990.

Length ranges for bass in Swan, Black, and Rose lakes were similar (Figure 10). Length-weight relationships for largemouth bass in Swan, Black, and Rose lakes were also similar (Table 25). These relationships were similar to other lakes in the Coeur d'Alene River system (Table 25). The length-weight relationship for Rose Lake has not changed significantly since 1990 (Table 25). In the Coeur d'Alene River system, a largemouth bass reaches 300 mm in its fifth or sixth year of life (Table 26). It appears that growth is faster in these lakes than in other northern Idaho lakes (Table 26).

Proportional stock density (PSD) is an index used to compare the proportion of quality-size bass (>300 mm) to stock-size bass (>200 mm) and is an easy index to compare populations of largemouth bass in other lakes. The largemouth bass PSD values for Swan, Black, and Rose lakes were 16, 66, and 24, respectively. Anderson (1980) recommended largemouth bass PSD values for Midwestern states range 40-70. Modde and Scalet (1985) reported optimum largemouth bass PSD values in Montana ranged 12 to 26. PSD values ranged 16 to 83 in northern Idaho (the 83 value is from Anderson Lake, which is a special regulations water that is currently managed with a 300 to 400 mm slot limit for largemouth bass).

The bass populations in Swan, Black, and Rose lakes appear to be healthy by northern Idaho standards. The sampling was completed in June 1995. Rieman (1983) recommended that bass populations be sampled in late fall for the best estimates pertaining to size and age compositions. In the future, bass populations will be sampled twice, once during the summer to get growth and age data and once in the fall to collect missing age group data and obtain a better sample to calculate PSD values.

Black crappie populations in Black and Rose lakes appear to have growth rates similar to growth rates in Benewah, Chatcolet, and Round (Benewah County) lakes (Table 27). Only 10 crappie were collected from Swan Lake, which was too few to get a good estimate of growth. Black crappie collected by electrofishing and gill nets from Swan, Black, and Rose lakes ranged in length from 80 to 305 mm.

Bluegill were first introduced into Rose Lake in 1990. Fourteen bluegill were collected by electrofishing and gill nets in Rose Lake. They ranged in length from 50 mm to 180 mm. This sample does indicate natural reproduction has occurred in Rose Lake. The length-weight relationship for bluegill, $\text{Log } W = -4.7577 + 2.99 \text{ Log } L$, was low when compared to those reported by Carlander (1977). The mean back-calculated lengths for bluegill were age 1 = 41 mm, age 2 = 84 mm, and age 3 = 130 mm. The back-calculated lengths were similar to those reported by Carlander (1977) for Wisconsin and Michigan and slightly higher than those reported for Montana and Oregon. Willis et al. (1992) reported similar back-calculated lengths for South Dakota waters. Carlander (1977) reported that growth appears to be highly variable regionally. He stated growth depends more on population and edaphic conditions than on latitude and growing season, but generally, growth is more rapid in the southern part of the range than in the northern.

The PSD value for bluegill in Rose Lake was 29. The sample size of 14 bluegill from Rose Lake is not an adequate sample size and the resulting PSD value may be biased. Anderson (1980) recommended an optimum range for bluegill PSD of 20-60. Novinger and Legler (1978) recommended

Table 24. Fish species present in Swan, Black, and Rose lakes, Idaho, June 1995.

Species	Swan Lake	Black Lake	Rose Lake
Largemouth bass	Y	Y	Y
Yellow perch	Y	Y	Y
Black crappie	Y	Y	Y
Pumpkinseed	Y	Y	Y
Bluegill	N	N	Y
Northern pike	Y	Y	Y
Kokanee	N	Y	N
Brown bullheads	Y	Y	Y
Squawfish	Y	Y	Y
Tench	Y	Y	Y

Y = Present
N = Not present

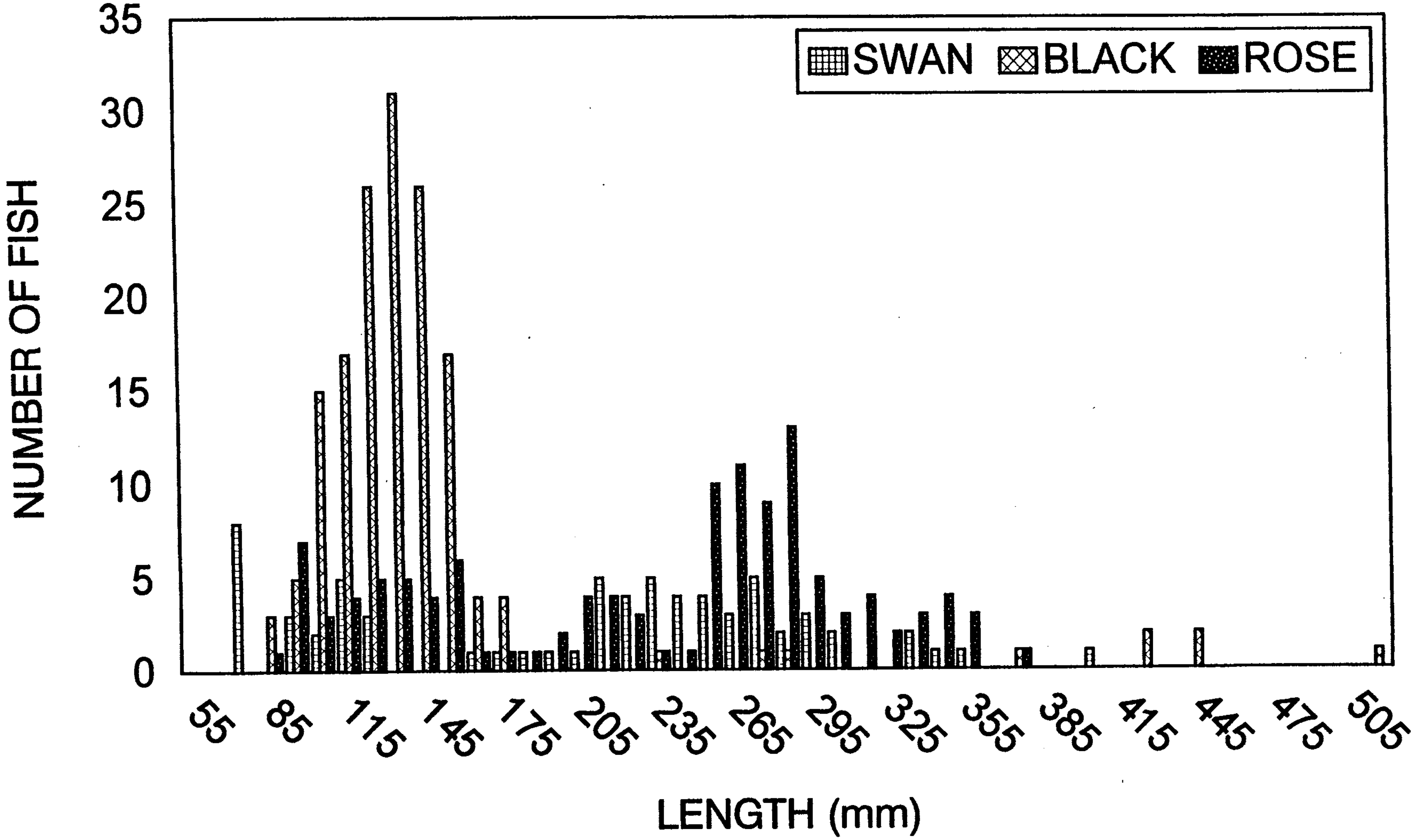

Figure 10. Length frequency of largemouth bass collected by electrofishing and gill netting, Swan, Black, and Rose lakes, Idaho, 1995.

Table 25. Length-weight equations for largemouth bass collected by gill nets and electrofishing from Swan, Black, and Rose lakes, Idaho, June 1995, compared to the standard equation and various other Idaho lakes.

Standard	Log Ws = -5.316 + 3.191 Log L
Swan	Log W = -4.791 + 2.94 Log L
Black	Log W = -5.049 + 3.08 Log L
Rose (1995)	Log W = -4.807 + 2.94 Log L
Rose (1990)	Log W = -4.863 + 2.97 Log L
Benewah	Log W = -5.362 + 2.196 Log L
Chatcolet	Log W = -5.69 + 3.340 Log L
Round	Log W = -5.336 + 3.189 Log L
Round[a]	Log W = -5.504 + 3.288 Log L
Thompson	Log W = -4.697 + 2.920 Log L
Fernan	Log W = -4.973 + 3.037 Log L
Anderson	Log W = -4.845 + 2.990 Log L
Blue (Coeur d'Alene system)	Log W = -4.585 + 2.890 Log L

[a]Howse 1966

Table 26. Mean back-calculated lengths at each annulus of largemouth bass captured by gill nets and electrofishing in Swan, Black, Rose, Kelso, and Little Round (Bonner County) lakes, Idaho, 1995, compared to various other Idaho lakes.

	Age																
Lake	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Swan	66	131	187	224	244	299	319										
Black	92	146	227	287	337	353	383	412	434	463	478	487					
Rose (1995)	80	152	209	248	283	312	329	347	391	414							
Rose (1990)	81	159	223	229	312	343	360										
Anderson	82	180	263	320	360	383	410										
Blue (Cd'A R.)	76	169	245	310	341	372											
Thompson	81	159	220	298	346	378	408	427	430								
Benewah	64	110	154	190	226	253	290	320	338	389	423	444	471	514	538	517	539
Chatcolet	65	116	164	211	254	287	322	366	393	434	462	486	501	533			
Round (Benewah Co)	103	176	244	302	361	398	437	460	470	463							
Hayden	49	69	96	123	154	185	221	257	299	343	446	520					
Lower Twin	63	101	125	155	196	231	276	329	366	380	411	447	465	490			
Fernan	74	130	175	204	237	270	297	376	437	459	486	502	520				
Cocolalla	71	94	118	152	189	223	257	282	296	399							
Kelso	71	126	183	225	266	324	384	417	450	428	459	486	511	535			
Little Round	76	138	181	209													

Table 27. Mean back-calculated length at each annulus for black crappie captured by gill nets and electrofishing from Black and Rose lakes, Idaho, June 1995, compared to various other Idaho lakes.

	Age											
Lake	1	2	3	4	5	6	7	8	9	10	11	12
Black	82	120	157	184	205	224	224	240				
Rose	57	117	182	217	256	272	284	294				
Benewah	68	112	150	190	196							
Chatcolet	70	111	146	186	204							
Round	66	108	144	176	215							
Lower Twin	56	82	113	139	168	193	220	260				
Hayden	33	54	75	96	118	142	109	196	220	246	286	330
Cocolalla	63	101	148	184	202	229	246					

a range of 20-40 for bluegill PSD was optimum where fishing for bass and bluegill is important. Modde and Scalet (1985) reported the average bluegill PSD in Montana was 10.

Kelso and Little Round Lakes

Kelso and Little Round lakes along with Granite Lake are found in the headwaters of the Hoodoo Creek drainage. The three lakes all lie at the same elevation of approximately 671 m. The three lakes are all connected by a low gradient swamp area. The general flow of the system appears to be from Kelso Lake to Little Round Lake to Granite Lake, and then from Granite Lake south under U.S. Highway 95 to an unnamed ephemeral lake approximately 500 m from Granite Lake (Figure 7). This flow pattern occurs only during high water periods; during low water periods, water from the three lakes subs into the aquifer. During extreme high water periods, water can flow out the west end of Kelso Lake and into Hoodoo Creek. Kelso Lake is the largest of the three at 24.8 ha compared with Little Round at 3.8 ha and Granite at 8.5 ha. Maximum and average depth of Kelso Lake is 14.6 m and 7.6 m. The maximum and average depth for Little Round Lake is 29 m and 15.2 m and the maximum and average depth for Granite Lake is 39.6 m and 20.7 m, respectively. Granite Lake is a meromictic lake with a chemocline at between 3 m and 6 m, depending on the time of year. The limnology of Granite Lake is limiting fish distribution to the upper 3 m layer of the lake. A fishery survey was not conducted on Granite Lake in 1995.

Kelso, Little Round, and Granite lakes are managed with quality bass regulations; two bass limit, none between 12 and 16 inches, January 1 to June 30 - closed to harvest. Fishing pressure on Kelso Lake can be quite high and hatchery supplementation with rainbow trout is made during the months of April, May, and June. Little Round Lake access is limited by private land holdings between the county road and the lake. The only easy access to Little Round Lake is to launch a small boat off the county road right of way into the weed choked inlet of the lake. Consequently, Little Round Lake receives little fishing effort.

Kelso Lake received a stocking of 400 bluegill sunfish of various size and age classes in 1982. The fishery survey of Kelso and Little Round lakes in 1995 showed that the introduction of bluegill to Kelso in 1982 not only established a self reproducing population of bluegill, but the bluegill have pioneered into Little Round Lake as well.

During 0.69 h of electrofishing effort and three units of gill net effort, four species of game fish and two species of non-game fish were sampled from Kelso Lake (Appendix L). Largemouth bass in the sample ranged from 60 mm to 529 mm. The PSD of largemouth bass in Kelso Lake was 24. The mean back-calculated length at age from scale samples of largemouth bass in Kelso Lake is shown in Table 26. The PSD of bluegill in Kelso Lake was 26. Bluegill sampled from Kelso Lake ranged from 50 mm to 169 mm in length. Back-calculation estimates of length at age for Kelso Lake bluegill was age 1 at 45 mm, age 2 at 80 mm, age 3 at 127 mm, and age 4 at 160 mm. Other fish species sampled from Kelso Lake included pumpkinseed sunfish, yellow perch, brown bullhead, and tench *Tinca tinca*. While no rainbow trout were found during the sample period, Kelso Lake does receive a hatchery stocking of 10,000 put-and-take rainbow trout each year during the months of April, May, and June.

Little Round Lake was sampled with 1 h of hook-and-line effort and two units of gill net effort during June of 1995. During the sampling period, three species of game fish were collected. A total of

32 bluegill, 6 largemouth bass, and 2 brook trout were sampled (Appendix M). The PSD of angler caught bluegill (no bluegill were sampled in gill nets) in Little Round Lake was 59. Because the Little Round Lake bluegill PSD is based on angler catch, it is considerably greater than that for bluegill in Kelso Lake where smaller bluegill were sampled with electrofishing gear. Limited access to Little Round Lake precluded the use of the electrofishing boat. Because only two scale samples were taken from Little Round Lake bluegill, no back-calculated age at length estimates were made. The mean back-calculated ages at length for largemouth bass from Little Round Lake were very close to those for Kelso Lake largemouth bass (Table 26). The two brook trout sampled from Little Round Lake measured 390 mm and 420 mm.

Recommendations for Kelso Lake are to continue with the current "quality" bass regulations and hatchery trout stocking program. Quality bass regulations should also be maintained for Little Round Lake as it is essentially part of Kelso Lake due to its proximity to the larger lake.

Freeman Lake

Freeman Lake (Figure 11) is located in Bonner County, Idaho on the Washington/Idaho border approximately 9 km east of the town of Priest River. The average depth of this 16 ha lake is 1.8 m and the maximum depth is approximately 5.2 m. The shallow nature of Freeman Lake is very conducive to rooted aquatic vegetation and there is a distinct vegetation line around the lake at about the 3 m depth. Public access to the shoreline of Freeman Lake is limited to the southwest corner of the lake where the IDFG owns approximately 540 m of lake shoreline. Located on the IDFG property is a boat ramp for small boats and a fishing dock. Freeman Lake is a two story fishery supporting both a warm and cold water fishery. Management of the fishery is under general statewide fishing regulations, with the exception of an electric motors only provision. The rainbow trout fishery in Freeman Lake is supported by an annual stocking of 5,000 put-and-take size rainbow trout. Tiger muskie were introduced to Freeman Lake starting in 1989 with an initial stocking of 100 fish. Since that time, another 195 tiger muskie have been stocked in Freeman Lake (110 fish in 1990, 35 in 1991, and 50 in 1993). Freeman Lake was surveyed on July 7, 1995 to evaluate the fishery community and the success of the tiger muskie introduction.

Six species of game fish were sampled from Freeman Lake during the survey period which entailed two units of gill net effort and two units of trap net effort (Figure 11 and Appendix N). Hatchery rainbow trout were the most frequently sampled fish. A total of 51 rainbow were collected, ranging in length from 200 mm to 339 mm. All the rainbow appeared to be from the 1995 stockings. Other fish sampled included largemouth bass, black crappie, pumpkinseed sunfish, yellow perch, and tiger muskie. Of the five largemouth bass collected from Freeman Lake, none exceeded the minimum PSD standard of 300 mm for a quality size. This is to be expected with a general bass regulation of five fish over 12 inches (305 mm). As soon as a bass reaches the minimum size limit they are harvested from the system. The length range of largemouth sampled from Freeman Lake was 250 mm to 299 mm. The two black crappie sampled from Freeman Lake measured 285 mm and 305 mm. Only one tiger muskie was captured during the sampling effort. This fish measured 510 mm and weighed 750 g. Angler reports from Freeman Lake indicate that legal size tiger muskie (30 inches and greater in length) are being taken annually. The few anglers that know how to catch tiger muskie from Freeman Lake are tight-lipped about their success, and an estimate of the tiger muskie harvest in not possible.

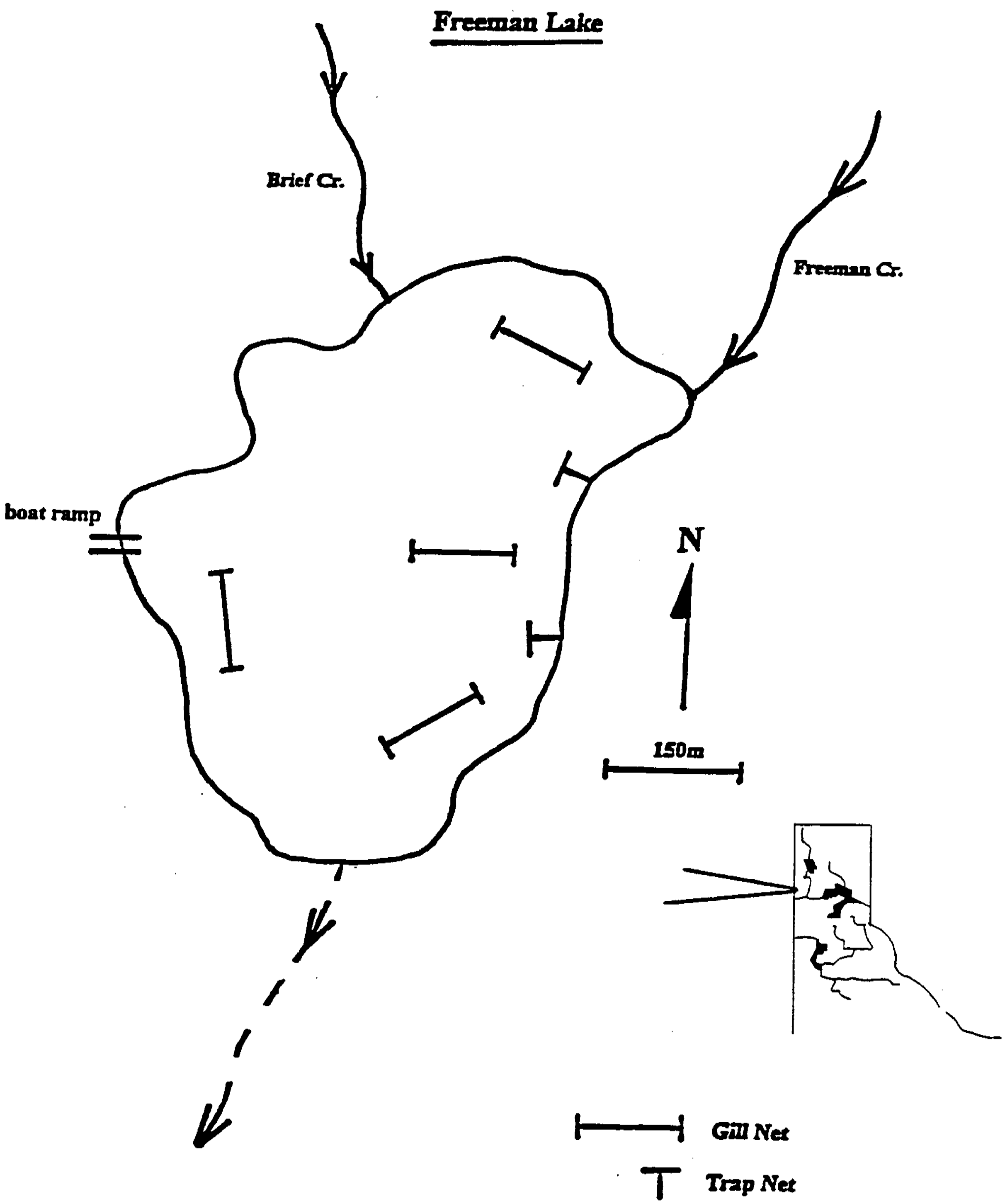

Figure 11. Map of Freeman Lake, Bonner County, Idaho, showing 1995 gill net and trap net locations.

Recommendations for Freeman Lake are to continue the tiger muskie and the put-and-take rainbow stocking programs.

Officer Creel Census of Panhandle Region Lowland Lakes

In 1995, impromptu creel census efforts by regional officers reported angler effort and catch on 51 lowland lakes in the Panhandle Region (Appendix O). These angler contacts were not part of any structured creel census but were associated with license checks and regulation enforcement. A total of 4,583 anglers were interviewed. These anglers spent 13,795 hours fishing. The majority of interviews and effort were from Lake Pend Oreille where 2,032 anglers spent 8,071 h fishing. Effort and catch rate by lake are presented in Appendix O.

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APPENDICES

Appendix A. Summary of Hayden Lake, Idaho property owners survey results 1994-1995 (333 survey returned).

HAYDEN LAKE ANGLING SURVEY 1994/1995

1. Have you fished Hayden Lake within the last 12 months?
   (Check one) Yes 44% (n=148) No 56% (n=185).

   If NO, please return questionnaire (or give to someone in your household that fishes).
   If YES, please continue.

2. How many people in your household fish Hayden Lake? ave. 2.088 (number).

3. How did you fish Hayden Lake on your last trip? (Check all that apply).

   From a boat 79% From shore 35% From a float tube 3%
   Other DOCK 16% (please specify)

4. What kind of terminal tackle did you use on your last trip? (Please check all that apply).

   Bait 51% Lures 83% Flies 21% Other ______ (please specify)

5. What was the primary species of fish you were trying to catch on your last fishing trip to Hayden Lake (Please check one)

Largemouth bass 44%	Yellow perch 12%	Cutthroat trout 26%	Rainbow trout 42%
Smallmouth bass 24%	Crappie 13%	Splake 1%	Northern pike 1%
Pumpkinseed 0	Other 0	Anything 11%	

6. How many fish of each species did you catch and how many did you release the last time you fished Hayden Lake?

Species	Caught	Kept	Released
Largemouth bass	1.3	.13	1.2
Smallmouth bass	1.5	.06	1.5
Black crappie	2.2	.48	1.8
Sunfish	2.3	.01	2.4
Yellow perch	2.2	.45	1.8
Northern pike	.45	.27	.16
Cutthroat trout	.18	.04	.14
Rainbow trout	.55	.18	.35
Splake	.27	.07	.02
Other (______)	.14	.05	.09

7. How many days in total did you spend fishing in Idaho last year?
   (mean-median) 20-10 Days per year

Appendix A. Continued.

8. How many days did you spend fishing at Hayden Lake last year?
 16-7.5 Days at Hayden Lake in a year

9. How many hours did you spend fishing at Hayden Lake on your last trip?
 3.9-3 Hours at Hayden Lake on last trip

Fish Management Questions

Hayden Lake has been managed as a quality fishery since 1988. We would appreciate your input on th management direction for crappie, bass, and trout.

Crappie *current regulation: 15 fish per day and none under 10 inches.*

Hayden lake was once known for its large crappie. Aging of these fish indicated that they were growing slowly due to the short growing season in northern Idaho. A 10 inch crappie was 6 years old and it takes 10 to 12 years to reach 14 inches. In previous years the small fish were the result of fish being harvested before they grew large (not stunting from over population). A special regulation was implemented in 1990 to reduce harvest of crappie with the intent of managing for better than average sized fish. We have two management options for crappie in Hayden Lake, general and quality. Under quality management (current regulations) the number of crappie harvested decreases but the average size increases to over 10 in. Under general management there would be no restrictions on harvest. However, under this option the average size of crappie would be less than 10 in. and there would be fewer crappie over 10 in long to harvest.

Please answer the following questions pertaining to the crappie fishery and crappie management on Hayden Lake

12. Do you fish for crappie? N=148 Yes 58% (n=83) No ___

13. On the average, how many legal size crappie (10 inches or longer) do you catch per day?
0 3.5% 1 - 5 20.9% 6 - 10 59.3% 11 - 15 11.6% 15+ 0 DNA 4.7%

14. On the average, I catch more crappie 10 inches or longer now than five years ago.

Yes 21% No 45% Same 17% DNA 16%

15. On the average I catch more crappie now than five years ago.

Yes 9% No 59% Same 15% DNA 16%

16. Would you prefer that Hayden Lake continue to be managed for quality crappie knowing that only a portio of the crappies caught could be harvested but average size of the crappie harvested would be over 10 inches?

Yes 75.6% No 10.5% No opinion 10.5% DNA 3.5%
If not, why not? ______________________

Appendix A. Continued.

17. Would you prefer that Hayden Lake be managed for general crappie knowing that you could harvest any crappies you caught but the average size would less than 10 inches?

Yes 12% No 70% No opinion 13% DNA 5.8%

Largemouth bass/Smallmouth bass *Two bass per day, none between 12 to 16 inches bass harvest from July 1 to December 31.*

The growing season for bass in northern Idaho is generally only 3 to 4 months a year. Bass can reach trophy size if they live long enough. A 12 inch bass is typically 6 to 9 years old. The quality bass regulations currently in effect are intended to provide high catch rates for better than average sized bass, while still allowing some limited harvest. The July 1 opener for harvest of bass protects large bass during the spring spawning season. The slot limit allows harvest of small and large bass, while providing high catch rates for the 12 to 16 inch bass. We have three management options for bass on Hayden Lake, general, quality (current management), and trophy.

General- The goal is uncomplicated fishing with a general bag limit of 5 bass per day and none under 12 inches. Under this option the number of bass over 12 inches would be reduced due to high harvest.

Quality- The goal is to be able to catch more larger fish by giving up some harvest opportunity. This option would provide more bass to catch in the 12 to 16 inch range and allow limited harvest.

Trophy- The goal is to catch more large trophy bass. Under this option harvest would be severely restricted (20 inch minimum) or eliminated (catch-and-release). However, the number harvested would be limited to two.

Please answer the following questions pertaining to the bass fishery and management on Hayden Lake:

18. Do you fish for bass?

Yes 71% No 29% N=148

19. Do you support the current bass regulations on Hayden Lake?

Yes 72.6% No 10.4% No opinion 6.6% DNA 10.4%

If NO, Why not? ____________________

20. Would you prefer that bass in Hayden Lake be managed for "general rules" knowing that the number of bass over 12 inches would be reduced because of increased harvest and that most bass caught would be less than 12 inches?
Yes 10.4% No 71.7% No opinion 11.3% DNA 6.6%

21. Would you prefer that bass in Hayden Lake be managed for "quality" (current management) knowing that harvest would be limited but more bass would be caught in the 12 to 16 inch range?

Appendix A. Continued.

Yes 60.4% No 26.4% No opinion 6.6% DNA 6.6%

22. Would you prefer that bass in Hayden Lake be managed for "trophy" knowing that harvest would be restricted to fish over 20 inches?

Yes 28.3% No 58.5% No opinion 8.5% DNA 4.7%

23. Would you prefer catch-and-release fishing only for bass on Hayden Lake?

Yes 28.3% No 54.7% No opinion 11.3% DNA 5.7%

24. Are you confident in your ability to tell the difference between a largemouth bass and a smallmouth bass?

Yes 82.1% No 16% DNA 1.9%

25. Do you think largemouth and smallmouth bass should be managed with separate regulations?

Yes 15.1% No 62.3% No opinion 21.7%
If YES, why? ____________

26. On the average, how many largemouth bass do you catch per day (please check one)?

0	28.3%	I do not fish for largemouth bass 11.3%
1 - 5	57.6%	
6 - 10	0.9%	
10+	0.9%	

27. On the average, how many smallmouth bass do you catch per day (please check one)?

0	22.7%	I do not fish for smallmouth bass 4.7%
1 - 5	61.3%	
6 - 10	9.4%	
10+	0.9%	

28. What percent of the time you spend fishing for bass do you fish for largemouth?(mean) 38.3 %
smallmouth?(mean) 35.6 % = 100%

Trout *2 fish per day and none under 14 inches*

Hayden Lake is currently being managed for quality trout fishing. All tributary streams have been closed to fishing to allow maximum production of wild cutthroat and rainbow trout. An additional 150,000 cutthroat and 300,000 rainbow trout fingerlings are stocked annually to supplement wild production. The 14 inch minimum length limit and two trout bag limit is designed to allow trout to grow to a larger size while still allowing some harvest. Splake, a brook trout - lake trout hybrid, were recently introduced as an experiment to see how well they utilize mysis shrimp and to see if they will reach trophy size.

Hayden Lake can be managed for general, quality or trophy trout.

Appendix A. Continued.

General- The goal is uncomplicated fishing with a general bag limit of 6 trout per day. Under this option the number of larger size trout would be reduced. Wild trout production would be reduced because immature fish would be harvested.

Quality- The goal is to be able to catch more larger fish by giving up some harvest opportunity. This option would provide more trout to catch over 14 inches.

Trophy- The goal is to catch more large trophy trout. Under this option harvest would be restricted to a 20 inch minimum or eliminated (catch-and-release). However, the number of trout caught and released would increase.

29. Do you fish for trout in Hayden Lake?

Yes 87% (n=129) No 13% N=148

30. Would you prefer that trout in Hayden Lake be managed for "general" knowing that the number of trout over 14 inches would be reduced due to increased harvest?

Yes 11.6% No 81.4% No opinion 3.9% DNA 3.1%

31. Would you prefer that trout in Hayden Lake be managed for "quality" (current management) knowing that harvest would be limited but more trout would be caught in the 14 inch and over range?

Yes 77.5% No 17.1% No opinion 3.9% DNA 1.6%

32. Would you prefer that trout in Hayden Lake be managed for "trophy" knowing that harvest would be restricted to fish over 20 inches?

Yes 20.2% No 73.6% No opinion 4.7% DNA 1.6%

33. Would you support catch-and-release fishing for trout on Hayden Lake?

Yes 29.5% No 58.1% No opinion 10.1% DNA 2.3%

34. On the average, how many trout do you catch per day?
0 34%, 1 44%, 2 9%, 3 5%, 4 1%, 5 0, 5+ 0 DNA 5.4%

YOUR HELP IS APPRECIATED!

Appendix B. Summary of angler survey results for Hayden Lake, Idaho, 1994-1995 (79 returns).

HAYDEN LAKE ANGLING SURVEY 1994/1995

1. Was Hayden Lake your primary destination? Yes 95% No 4% .

   If NO, what was your primary destination? ______ .

2. Was fishing the primary reason you came to Hayden Lake? Yes 95% No 5%.

   If NO, what was your primary reason ______ .

3. How did you fish Hayden Lake on your last trip? (Check all that apply).

   From a boat 77% .
   From shore 27% .
   From a float tube 1 .
   Other DOCK 5% (please specify)

4. What kind of terminal tackle did you use on your last trip? (Please check all that apply).

   Bait 49% Lures 76% Flies 8% Other 0 (please specify)

5. How many days in total did you spend fishing in Idaho last year?

   Mean-Median
   59-35 Days per year

6. How many days did you spend fishing at Hayden Lake last year?

   25-15 Days at Hayden Lake in a year

7. How many hours did you spend fishing at Hayden Lake on your last trip?

   6.0-6 Hours at Hayden Lake on last trip

8. Did you enjoy your last trip to Hayden Lake?

   Yes 89% No 9% Did not answer 3%

Appendix B. Continued.

Fish Management Questions

Hayden Lake has been managed as a quality fishery since 1988. We would appreciate your input on th management direction for crappie, bass, and trout.

Crappie *Current regulation: 15 fish per day and none under 10 inches.*

Hayden lake was once known for its large crappie. Aging of these fish indicated that they were growing slowl due to the short growing season in northern Idaho. A 10 inch crappie was 6 years old and it takes 10 to 12 year to reach 14 inches. In previous years, small fish were the result of fish being harvested before they grew large (no stunting from over population). A special regulation was implemented in 1990 to reduce harvest of crappie witl the intent of managing for better than average sized fish. We have two management options for crappie in Haydeı Lake, general and quality. Under quality management (current regulations) the number of crappie harvestec decreases but the average size increases to over 10 in. Under general management there would be no restriction on harvest. However, under this option the average size of crappie would be less than 10 in and there would b fewer crappie over 10 in long to harvest.

Please answer the following questions pertaining to the crappie fishery and crappie management on Hayden Lake

9. Do you fish for crappie? Yes 52% No 48 N=79

10. On the average, how many legal size crappie (10 inches or longer) do you catch per day?

0	1	DNA 24
1 - 5	33	
6 - 10	32	
11 - 15	5	
15+	4	

11. On the average, I catch more crappie 10 inches or longer now than five years ago.

Yes 24% No 16% Same 11% DNA 47%

12. On the average I catch more crappie now than five years ago.

Yes 15% No 24% Same 14% DNA 47%

13. Would you prefer that Hayden Lake continue to be managed for quality crappie knowing that only a portion of the crappies caught could be harvested but average size of the crappie harvested would be over 10 inches?

Yes 76% No 4% No opinion 11 DNA 9

14. Would you prefer that Hayden Lake be managed for general crappie knowing that you could harvest any crappies you caught but the average size would less than 10 inches?

Yes 6% No 66% No opinion 16% DNA 10

Appendix B. Continued.

Largemouth bass/Smallmouth bass *Two bass per day, none between 12 to 16 inches bass harvest from Jul 1 to December 31.*

The growing season for bass in northern Idaho is generally only 3 to 4 months a year. Bass can reach trophy siz if they live long enough. A 12 inch bass is typically 6 to 9 years old. The quality bass regulations currently i effect are intended to provide high catch rates for better than average sized bass, while still allowing some limite harvest. The July 1 opener for harvest of bass protects large bass during the spring spawning season. The slc limit allows harvest of small and large bass, while providing high catch rates for the 12 to 16 inch bass. We hav three management options for bass on Hayden Lake, general, quality (current management), and trophy.

General- The goal is uncomplicated fishing with a general bag limit of 5 bass per day and non under 12 inches. Under this option the number of bass over 12 inches would be reduce due to high harvest.

Quality- The goal is to be able to catch more larger fish by giving up some harvest opportunity This option would provide more bass to catch in the 12 to 16 inch range and allow limite harvest .

Trophy- The goal is to catch more large trophy bass. Under this option harvest would be severel restricted (20 inch minimum) or eliminated (catch-and-release). However, the numbe of bass harvested would be limited to two.

Please answer the following questions pertaining to the bass fishery and management on Hayden Lake:

15. Do you fish for bass?

Yes 86% No 14% N=79

16. Do you support the current bass regulations on Hayden Lake?

Yes 77% No 14% No opinion 6 DNA 3

If NO, Why not? Most wanted stricter regulations

17. Would you prefer that bass in Hayden Lake be managed for "general rules" knowing that the number o bass over 12 inches would be reduced because of increased harvest and that most bass caught would be less than 12 inches?

Yes 6% No 84% No opinion 8% DNA 3

18. Would you prefer that bass in Hayden Lake continue to be managed for "quality" (current management) knowing that harvest would be limited but more bass would be caught in the 12 to 16 inch range?

Yes 63% No 28% No opinion 8 DNA 1

Appendix B. Continued.

19. Would you prefer that bass in Hayden Lake be managed for "trophy" knowing that harvest would be restricted to fish over 20 inches?

Yes 42% No 46% No opinion 11% DNA 1

20. Would you prefer catch-and-release fishing only for bass on Hayden Lake?

Yes 30% No 59% No opinion 8% DNA 3

21. Are you confident in your ability to tell the difference between a largemouth bass and a smallmouth bass?

Yes 94% No 6%

22. Do you think largemouth and smallmouth bass should be managed with separate regulations?

Yes 24% No 59 No opinion 14% DNA 3

If YES, why? Most thought that they were different species, with different biology

23. On the average, how many largemouth bass do you catch per day (please check one)?

0 10%
1 - 5 54% I do not fish for largemouth bass 11%
6 - 10 11%
10+ 11%

24. On the average, how many smallmouth bass do you catch per day (please check one)?

0 8% I do not fish for smallmouth bass 11%
1 - 5 57%
6 - 10 16%
10+ 4%

25. What percent of the time you spend fishing for bass do you fish for

mean
largemouth? 45 %
smallmouth? 31 %

Trout *2 fish per day and none under 14 inches*

Hayden Lake is currently being managed for quality trout fishing. All tributary streams have been closed to fishing to allow maximum production of wild cutthroat and rainbow trout. An additional 150,000 cutthroat and 300,000 rainbow trout fingerlings are stocked annually to supplement wild production. The 14 inch minimum length limit and two trout bag limit is designed to allow trout to grow to a larger size while still allowing some harvest. Splake, a brook trout - lake trout hybrid, were recently introduced as an experiment to see how well they utilize mysis shrimp and to see if they will reach trophy size.
Hayden Lake can be managed for general, quality or trophy trout.

Appendix B. Continued.

General- The goal is uncomplicated fishing with a general bag limit of 6 trout per day. Under th option the number of larger size trout would be reduced. Wild trout production would t reduced because immature fish would be harvested.

Quality- The goal is to be able to catch more larger fish by giving up some harvest opportunit This option would provide more trout to catch over 14 inches.

Trophy- The goal is to catch more large trophy trout. Under this option harvest would be restricte to a 20 inch minimum or eliminated (catch-and-release). However , the number of trou caught and released would increase.

26. Do you fish for trout in Hayden Lake?

Yes 76% No 24 N=79

27. Would you prefer that trout in Hayden Lake be managed for "general" knowing that the number of trou over 14 inches would be reduced due to increased harvest?

Yes 0 No 84% No opinion 13% DNA 3

28. Would you prefer that trout in Hayden Lake be managed for "quality" (current management) knowing tha harvest would be limited but more trout would be caught in the 14 inch and over range?

Yes 72% No 16% No opinion 9% DNA 3

29. Would you prefer that trout in Hayden Lake be managed for "trophy" knowing that harvest would b restricted to fish over 20 inches?

Yes 29% No 56% No opinion 11% DNA 4

30. Would you support catch-and-release fishing for trout on Hayden Lake?

Yes 29% No 61% No opinion 5% DNA 5

31. On the average, how many trout do you catch per day?

0 25%, 1 38%, 2 16%, 3 8%, 4 3%, 5 1, 5+ 0, NA 9%

YOUR HELP IS APPRECIATED!

Appendix C. Simrad EY500 echosounder menu settings for Priest and Upper Priest lakes, Idaho, July 10 and 11, 1995.

EY500 MENUS

Operation Menu	
Ping mode	Normal
Ping Auto Start	Off
Ping Interval	0.5s
Disk Menu	
Log	Off
Max File Size	5 Mb
Telegram Menu	
Status	Off
Parameter	On
Annotation	On
Navigation	On
Depth	On
Echogram	On
Echo-trace	On
Sv	Off
Sample Angle	Off
Sample Power	Off
Sample Sv	Off
Sample Ts	Off
Vessel-Log	On
Layer	On
Integrator	On
TS Distribution	On
Echogram Menu	
Range	100 m
Range Start	0 m
Auto Range	Off
Bottom Range	7 m
Bot. Range Start	6 m
No. of Main Val.	250
No. of Bot. Val.	75
TVG	20 log R
Display Menu	
Colour Set	Dark
Event Marker	On
Echogram Speed	1:1
Echogram	On
Echogram Menu	

Appendix C. Continued

Echogram Menu

Transd. Number	1
Range	100 m
Range Start	0 m
Auto Range	Off
Bottom Range	0 m
Bot. Range Start	0 m
Bot. Range Pres.	Off
Sub. Bottom Gain	0.0/dB/m
Presentation	Normal
TVG	40 log R
Scale Lines	10
Bot. Det. Line	On
Layer lines	Off
Integration Line	Off
TS Colour Min.	-50 dB
Sv Colour Min.	-50 dB

Printer Menu

Navig. Interval	0
Event Marker	Off
Annotation	Off
Naut. Mile Marker	Off
TS Distribution	Off
Integr. Tables	Off
Echogram Speed	1:1
Echogram	Off
Echogram Menu	

Echogram Menu

Transd. Number	1
Range	100 m
Range Start	0 m
Auto Range	Off
Bottom Range	10 m
Bot. Range Start	5 m
Bot. Range Pres.	Off
Sub. Bottom Gain	0.0 dB/m
Presentation	Normal
TVG	40 log R
Scale Lines	10
Bot. Det. Line	On
Layer lines	Off
Integration Line	Off
TS Colour Min.	-60 dB
Sv Colour Min.	-60 dB

Appendix C. Continued

Transceiver Menu 120 kHz

Mode	Active
Transducer Depth	0.53 m
Transd. Sequence	Off
Absorption Coef.	0 dBkm
Pulse Length	Medium
Bandwidth	Wide
Max. Power	60 W
2-Way Beam Angle	-20.8 dB
Sv Transd. Gain	-26.6 dB*
TS Transd. Gain	-26.6 dB*
Angle Sensitiv.	21.0
3 dB Beamwidth	9.0 dg
Alongship Offset	-0.07 dg
Athw.ship Offset	-0.06 dg

Bottom Detection Menu

Minimum Depth	0.0 m
Maximum Depth	300 m
Min. Depth Alarm	0.0 m
Max. Depth Alarm	0 m
Bottom Lost Al.	Off
Minimum Level	-50 dB

Log Menu

Mode	Time
Ping Interval	100
Time Interval	300 sec
Dist. Interval	0.5 nm
Simulator Speed	5.0 knt
Distance	2.5

Layer Menu

Super Layer	10
Layer-X Menu	1,2,3...
Type	Pelagic
Range	10.0 m
Range Start	1,10,20m
Margin	1.0 m
Sv Threshold	-60 db

TS Detection Menu

Min. Value	-50 dB
Min. Echo Length	0.8
Max. Echo Length	1.8
Max. Gain Comp.	4.0 dB
Max. Phase Dev.	4.0

Appendix C. Continued

Serial Com. Menu

Telegram Menu

Format	Binary
Modem Control	On
Remote Control	On
Status	Off
Parameter	On
Annotation	Off
Navigation	Off
Depth	Off
Echogram	Off
Echo-Trace	Off
Sv	Off
Vessel Log	Off
Layer	Off
Integrator	Off
TS Distribution	Off

USART Menu

Baudrate	9600
Bits Per Char.	8
Stop Bits	1
Parity	None

Echogram Menu

Range	100 m
Range Start	0 m
Auto Range	Off
Bottom Range	15 m
Bot. Range Start	10 m
No. of Main Val.	250
No. of Bot. Val.	75
TVG	40 log R

Annotation Menu

Event Counter	0
Time Interval	0 min
Text	

Appendix C. Continued.

Navigation Menu

Start Sequence	$GPGLL
Separation Char.	002C
Stop Character	000D
First Field No.	2
No. of Fields	4
Baudrate	4800
Bits Per Char.	8
Stop Bits	1
Parity	None

Utility Menu

Beeper	
Status Messages	
Date	On
Time	On
Password	yy.mm.dd
Default Setting	hh.mm.ss
Sound Velocity	0
COM1/COM2 Switch	N0
	1450 m/s *
	Off

Test Menu

Message	
Transceiver	
Version	4.01
Scope	
Simrad	

* - Setting changed depending on temperature.

Appendix D. Global positioning system (GPS) readings for various landmarks on Priest and Upper Priest lakes, Idaho. Readings were taken with a hand held Garmin GPS 45, May 23 and June 27, 1995.

Way Point No.	Way Point Location	Latitude/Longitude
1	Bishop's Marina - Coolin	N48°28.839'/W116°51.091'
2	Point - S.E. of Outlet Bay	N48°29.539'/W116°52.391'
3	Outlet Bay Marina	N48°29.663'/W116°53.376'
4	Mouth of Soldier Creek	N48°30.192'/W116°50.346'
5	Osprey Campground	N48°30.328'/W116°53.249'
6	Hess Point	N48°31.344'/W116°51.173'
7	Point - S. of Shoshone Bay	N48°31.534'/W116°53.280'
8	Four Mile Island white nav-light	N48°31.701'/W116°51.588'
9	Point - N. of Shoshone Bay	N48°32.089'/W116°53.652'
10	Cavanaugh Bay Marina	N48°31.441'/W116°49.466'
11	Blue Diamond Marina	N48°31.940'/W116°50.050
12	Rocky Point nav-light	N48°32.381'/W116°50.305'
13	Point - W. of Rocky Point	N48°32.391'/W116°50.780'
14	Point - S. of the N. Bartoo white nav-light	N48°32.832'/W116°51.922'
15	N. Bartoo white nav-light	N48°33.192'/W116°51.800'
16	S.W. Bartoo white nav-light	N48°32.626'/W116°53.155'
17	Hill's Resort, Luby Bay	N48°32.313'/W116°55.227'
18	Kalispell Point USFS boat launch	N48°33.608'/W116°55.545'
19	Papoose Island	N48°33.362'/W116°53.518'
20	Three Pines Campground - E. Kalispel Island	N48°33.947'/W116°53.607'
21	Mouth of Hunt Creek	N48°33.762'/W116°49.828'
22	Eightmile Island red nav-light	N48°34.774'/W116°51.014'
23	Indian Rock white nav-light	N48°34.775'/W116°53.922'
24	Woody's Roost	N48°36.066'/W116°51.660'
25	Pinto Point	N48°36.172'/W116°50.777'

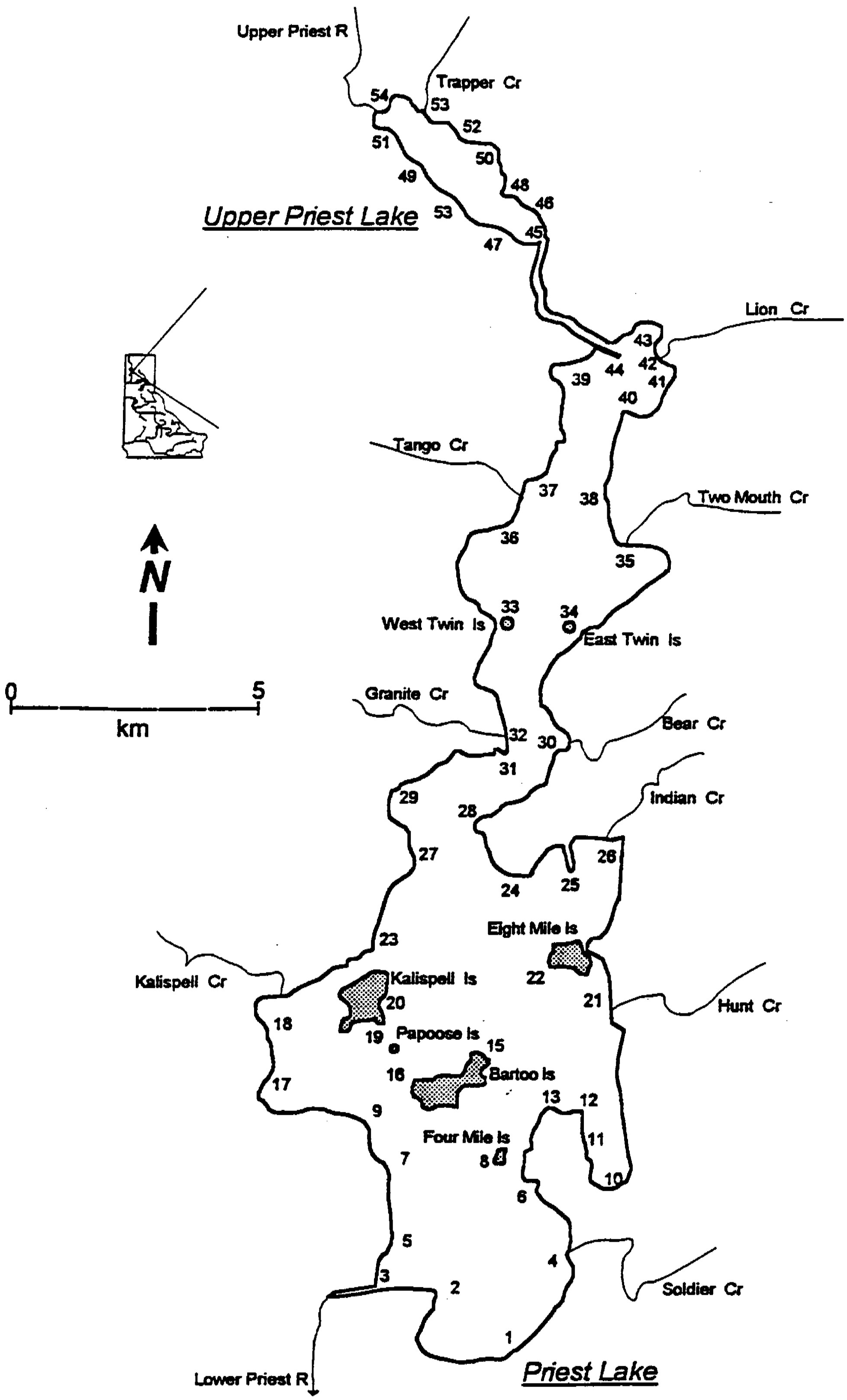
Appendix D. Continued.

Way Point No.	Way Point Location	Latitude/Longitude
26	Mouth of Indian Creek	N48°36.614'/W116°50.206'
27	Green nav-light ~1.6 km S. Reeder Bay	N48°36.193'/W116°53.223'
28	Cape Horn red nav-light	N48°36.885'/W116°52.427'
29	Elkins Resort, Reeder Bay	N48°37.331'/W116°53.654'
30	Point - S. of Bear Creek	N48°37.976'/W116°51.301'
31	Kaniksu Resort	N48°38.025'/W116°51.868'
32	Mouth of Granite Creek	N48°38.383'/W116°51.833'
33	West Twin Island green nav-light	N48°39.911'/W116°51.982'
34	East Twin Island red nav-light	N48°39.874'/W116°50.917'
35	Mouth of Two Mouth Creek	N48°41.240'/W116°50.190'
36	Point - N. of Distillery Bay	N48°41.576'/W116°52.007'
37	Point - S. of Teacher Bay	N48°42.396'/W116°51.397'
38	Barbieri's cabin	N48°42.161'/W116°50.585'
39	Tripod Point	N48°43.128'/W116°51.202'
40	Canoe Point	N48°43.265'/W116°50.261'
41	Squaw Bay boat dock	N48°44.004'/W116°49.520'
42	Mouth of Lion Creek	N48°44.115'/W116°49.947'
43	Lion Head boat launch	N48°44.550'/W116°50.056'
44	Thorofair entrance white nav-light	N48°44.372'/W116°50.567'
45	Upper Priest Lake outlet	N48°45.936'/W116°51.902'
46	Rock island	N48°46.339'/W116°52.018'
47	Plowboy Campground	N48°46.215'/W116°52.847'
48	Point - ~1.6 km S.E. 50	N48°46.759'/W116°52.616'
49	Point - ~2.4 km N.W. of 47	N48°47.010'/W116°53.837'
50	Bay - ~0.8 km S.E. 52	N48°47.390'/W116°52.760'
51	Navigation Campground	N48°47.641'/W116°54.430'

Appendix D. Continued.

Way Point No.	Way Point Location	Latitude/Longitude
52	Point - ~0.8 km S.E. Trapper	N48°47.540'/W116°53.383'
53	Mouth Trapper Creek	N48°47.712'/W116°53.827'
54	Mouth Upper Priest River	N48°47.922'/W116°54.563'
55	Point - ~0.8 km N.W. of 47	N48°47'03.6"/W116°53'15.2"

Appendix E. GPS (Global Positioning System) locations on Priest and Upper Priest lakes, Idaho. Appendix D identifies each numbered location and provides coordinates for each location.



Appendix F. Summary of fishing effort and harvest for Hayden Lake, Idaho, July 1 - November 30, 1994.

Date: 12/05/94 Time: 12:22:35 pm
Page: 1

Idaho Department of Fish and Game
Creel Survey System
Pressure Report by Interval and Daytype
Summary

Body of Water: HAYDEN LAKE Year: 1994 EPA Number: 0000000000000

SECTION NUMBER	INTERVAL	DAYTYPE	BOAT ANGLERS HOURS	BANK ANGLERS HOURS	TUBE ANGLERS HOURS	ICE ANGLERS HOURS	TOTAL ANGLERS HOURS
1	1	Weekday	3328	919	0	0	4247
		Weekend	2242	1176	0	0	3418
	Interval 1 totals:		5570	2095	0	0	7665
	+/- at 95% C.I.:		1693	1174	0	0	2060
1	2	Weekday	2041	355	0	0	2396
		Weekend	1892	302	0	0	2194
	Interval 2 totals:		3933	657	0	0	4590
	+/- at 95% C.I.:		1519	244	0	0	1539
1	3	Weekday	2511	1044	0	0	3555
		Weekend	558	67	0	0	625
	Interval 3 totals:		3069	1111	0	0	4180
	+/- at 95% C.I.:		830	494	0	0	966
1	4	Weekday	1798	548	0	0	2346
		Weekend	1328	260	0	0	1588
	Interval 4 totals:		3126	808	0	0	3934
	+/- at 95% C.I.:		791	248	0	0	829
1	5	Weekday	976	287	0	0	1263
		Weekend	1456	94	0	0	1550
	Interval 5 totals:		2432	381	0	0	2813
	+/- at 95% C.I.:		544	235	0	0	593
1	6	Weekday	1269	225	0	0	1494
		Weekend	688	105	0	0	793
	Interval 6 totals:		1957	330	0	0	2287
	+/- at 95% C.I.:		667	249	0	0	712
1	7	Weekday	512	20	0	0	532

: 12/05/94 Time: 12:22:40 pm
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Idaho Department of Fish and Game
Creel Survey System
Pressure Report by Interval and Daytype
Summary

of Water: HAYDEN LAKE Year: 1994 EPA Number: 0000000000000

:ON :R	INTERVAL	DAYTYPE	BOAT ANGLERS HOURS	BANK ANGLERS HOURS	TUBE ANGLERS HOURS	ICE ANGLERS HOURS	TOTAL ANGLERS HOURS
:	7	Weekend	609	56	0	0	665
	Interval 7 totals:		1121	76	0	0	1197
	+/- at 95% C.I.:		416	89	0	0	425
:	8	Weekdav	380	33	0	0	413
		Weekend	614	39	0	0	653
	Interval 8 totals:		994	72	0	0	1066
	+/- at 95% C.I.:		487	102	0	0	498
:	9	Weekday	59	0	0	0	59
		Weekend	410	0	0	0	410
	Interval 9 totals:		469	0	0	0	469
	+/- at 95% C.I.:		497	0	0	0	497
:	10	Weekday	58	0	0	0	58
		Weekend	104	12	0	0	115
	Interval 10 totals:		162	12	0	0	173
	+/- at 95% C.I.:		149	23	0	0	150
	Section 1 totals:		22833	5542	0	0	28374
	+/- at 95% C.I.:		2812	1370	0	0	3129
	Season totals:		22833	5542	0	0	28374
	+/- at 95% C.I.:		2812	1370	0	0	3129

of Report.

Idaho Department of Fish and Game
Creel Survey System
Summary for Harvest by Section and Interval

:f Water: HAYDEN LAKE Year of Census: 1994 EPA Number: 0000000020000

IT	DY CD	FISH KEPT	FISH RELEASED	FISH CAUGHT	RBT	RBTLV	RBTRV	RBTAD	CT	CTAD	LMB	SMB
1	1	505	3691	4196	25	0	0	0	0	0	51	76
	2	403	2642	3045	123	0	0	0	0	0	31	0
Tot:		908	6333	7241	148	0	0	0	0	0	82	76
5%CI:		558	1688	3171	162	0	0	0	0	0	111	123
2	1	860	3108	3968	38	0	0	0	0	0	0	0
	2	147	2247	2394	53	0	0	0	0	0	13	26
Tot:		1007	5355	6362	91	0	0	0	0	0	13	26
5%CI:		743	1813	3498	84	0	0	0	0	0	6	46
3	1	1184	2602	3790	18	0	0	0	71	0	18	36
	2	175	375	550	25	0	0	0	0	0	0	0
Tot:		1359	2977	4340	43	0	0	0	71	0	18	36
5%CI:		1171	697	1803	54	0	0	0	73	0	4	72
4	1	293	2177	2470	0	0	0	0	14	0	14	45
	2	135	1089	1226	30	0	0	0	17	0	6	52
Tot:		428	3266	3696	30	0	0	0	31	0	20	97
5%CI:		242	696	1542	33	0	0	0	7	0	4	104
5	1	136	760	897	0	0	0	0	0	0	0	0
	2	271	298	569	51	0	0	0	0	0	26	78
Tot:		407	1058	1466	51	0	0	0	0	0	26	78
5%CI:		330	206	711	99	0	0	0	0	0	32	115
6	1	1878	1050	2927	0	0	0	0	0	0	21	0
	2	59	282	341	35	0	0	0	12	0	0	0
Tot:		1937	1332	3268	35	0	0	0	12	0	21	0
5%CI:		1944	458	2375	38	0	0	0	17	0	43	0
7	1	75	420	495	0	0	0	0	0	0	0	0
	2	86	215	301	11	0	0	0	11	0	0	0

Idaho Department of Fish and Game
Creel Survey System
Summary for Harvest by Section and Interval

:f Water: HAYDEN LAKE | Year of Census: 1994 | EPA Number: 0000000020000

DY :T CD	FISH KEPT	FISH RELEASED	FISH CAUGHT	RBT	RBTLV	RBTRV	RBTAD	CT	CTAD	LMB	SMB
Tot:	161	635	796	11	0	0	0	11	0	0	0
5%CI:	175	221	568	24	0	0	0	24	0	0	0
8 1	17	254	272	0	0	0	0	0	0	0	0
2	66	347	413	0	0	0	0	0	0	0	0
Tot:	83	601	685	0	0	0	0	0	0	0	0
5%CI:	80	276	664	0	0	0	0	0	0	0	0
9 1	0	0	0	0	0	0	0	0	0	0	0
2	170	40	210	0	0	0	0	0	0	0	0
Tot:	170	40	210	0	0	0	0	0	0	0	0
5%CI:	226	40	264	0	0	0	0	0	0	0	0
10 1	0	32	32	0	0	0	0	0	0	0	0
2	12	23	35	6	0	0	0	0	0	0	0
Tot:	12	55	67	6	0	0	0	0	0	0	0
5%CI:	17	44	78	10	0	0	0	0	0	0	0
11 1	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0
Tot:	0	0	0	0	0	0	0	0	0	0	0
5%CI:	0	0	0	0	0	0	0	0	0	0	0
Tot:	6472	21652	28131	415	0	0	0	125	0	180	313
% CI:	2504	2737	5908	223	0	0	0	79	0	124	215
Tot:	6472	21652	28131	415	0	0	0	125	0	180	313
% CI:	2504	2737	5908	223	0	0	0	79	0	124	215

F Report.

Idaho Department of Fish and Game
Creel Survey System
Summary for Harvest by Section and Interval

of Water: HAYDEN LAKE | Year of Census: 1994 | EPA Number:

INT	DY CD	BCR	BCK	SPLAKE	PERCH	PIKE	SUNFISH	ANY	OTHER	BK
1	1	709	76	0	204	0	25	0	51	0
	2	62	31	0	219	0	0	0	0	0
1 Tot:		771	107	0	423	0	25	0	51	0
95%CI:		1004	141	0	363	0	0	0	87	0
2	1	618	355	0	431	19	19	0	0	0
	2	13	0	0	26	26	0	0	0	0
2 Tot:		631	355	0	457	45	19	0	0	0
95%CI:		1157	439	0	476	67	49	0	0	0
3	1	235	252	0	558	107	0	0	107	0
	2	0	0	0	50	50	0	0	50	0
3 Tot:		235	252	0	608	157	0	0	157	0
95%CI:		291	317	0	940	166	0	0	197	0
4	1	73	59	0	45	117	0	0	0	0
	2	11	11	0	0	17	0	0	0	0
4 Tot:		84	70	0	45	134	0	0	0	0
95%CI:		126	83	0	67	132	0	0	0	0
5	1	0	0	0	68	28	0	0	40	0
	2	0	0	0	51	12	0	0	0	0
5 Tot:		0	0	0	119	40	0	0	40	0
95%CI:		0	0	0	148	48	0	0	80	0
6	1	0	61	0	1473	323	0	0	0	0
	2	71	0	0	12	0	0	0	0	0
6 Tot:		71	61	0	1485	323	0	0	0	0
95%CI:		155	72	0	1747	362	0	0	0	0
7	1	0	0	0	0	0	0	0	0	0
	2	0	0	0	11	54	0	0	0	0

12/05/94 Time: 12:37:03 pm
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Idaho Department of Fish and Game
Creel Survey System
Summary for Harvest by Section and Interval

of Water: HAYDEN LAKE Year of Census: 1994 EPA Number:

DY NT	CD	BCR	BCK	SPLAKE	PERCH	PIKE	SUNFISH	ANY	OTHER	BK
Tot:		0	0	0	11	54	0	0	0	0
95%CI:		0	0	0	20	77	0	0	0	0
8	1	0	0	0	0	9	0	0	9	0
	2	0	0	0	0	66	0	0	0	0
Tot:		0	0	0	0	75	0	0	9	0
95%CI:		0	0	0	0	78	0	0	19	0
9	1	0	0	0	0	0	0	0	0	0
	2	0	0	0	0	170	0	0	0	0
Tot:		0	0	0	0	170	0	0	0	0
95%CI:		0	0	0	0	226	0	0	0	0
10	1	0	0	0	0	0	0	0	0	0
	2	0	0	0	0	6	0	0	0	0
Tot:		0	0	0	0	6	0	0	0	0
95%CI:		0	0	0	0	15	0	0	0	0
11	1	0	0	0	0	0	0	0	0	0
	2	0	0	0	0	0	0	0	0	0
Tot:		0	0	0	0	0	0	0	0	0
95%CI:		0	0	0	0	0	0	0	0	0
Tot:		1792	845	0	3148	1004	44	0	257	0
95% CI:		1624	570	0	2078	496	49	0	230	0
Tot:		1792	845	0	3148	1004	44	0	257	0
95% CI:		1624	570	0	2078	496	49	0	230	0

of Report.

12/05/94
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Idaho Department of Fish and Game
Creel Survey System
Summary for Catch Rate by Day Type and Interval - for Species 9 - 24

of Water: HAYDEN LAKE　　　Year of Census: 1994　　　EPA Number:

IT	DAYTYPE	CR-KPT BCR	CR-KPT BCK	CR-KPT SPLAKE	CR-KPT PERCH	CR-KPT PIKE	CR-KPT SUNFIS	CR-KPT ANY	CR-KPT OTHER	CR-KPT BK
1	Weekday	0.17	0.02	0.00	0.05	0.00	0.01	0.00	0.01	0.00
	Weekend	0.02	0.01	0.00	0.06	0.00	0.00	0.00	0.00	0.00
2	Weekday	0.26	0.15	0.00	0.18	0.01	0.01	0.00	0.00	0.00
	Weekend	0.01	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00
3	Weekday	0.07	0.07	0.00	0.16	0.03	0.00	0.00	0.03	0.00
	Weekend	0.00	0.00	0.00	0.08	0.08	0.00	0.00	0.08	0.00
4	Weekday	0.03	0.03	0.00	0.02	0.05	0.00	0.00	0.00	0.00
	Weekend	0.01	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00
5	Weekday	0.00	0.00	0.00	0.05	0.02	0.00	0.00	0.03	0.00
	Weekend	0.00	0.00	0.00	0.03	0.01	0.00	0.00	0.00	0.00
6	Weekday	0.00	0.04	0.00	0.99	0.22	0.00	0.00	0.00	0.00
	Weekend	0.09	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00
7	Weekday	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Weekend	0.00	0.00	0.00	0.02	0.08	0.00	0.00	0.00	0.00
8	Weekday	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.02	0.00
	Weekend	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.00
9	Weekday	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Weekend	0.00	0.00	0.00	0.00	0.42	0.00	0.00	0.00	0.00
10	Weekday	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Weekend	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00
11	Weekday	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Weekend	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1	wkdy CR:	0.05	0.03	0.00	0.13	0.03	0.00	0.00	0.01	0.00
1	wknd CR:	0.01	0.00	0.00	0.02	0.07	0.00	0.00	0.01	0.00
1	Sson CR:	0.04	0.02	0.00	0.10	0.04	0.00	0.00	0.01	0.00
	Season CR:	0.05	0.03	0.00	0.13	0.03	0.00	0.00	0.01	0.00
	Season CR:	0.01	0.00	0.00	0.02	0.07	0.00	0.00	0.01	0.00
	Season CR:	0.04	0.02	0.00	0.10	0.04	0.00	0.00	0.01	0.00

f Report.

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Idaho Department of Fish and Game
Creel Survey System
Summary for Catch Rate by Day Type and Interval - for Total hours

of Water: HAYDEN LAKE 1994 EPA Number: 0000000000000

NT	DAYTYPE	CR KEPT	CR RELSD	CR CGHT	CR- KEPT	RBT REL	CR- KEPT	RBTLV REL	CR- KEPT	RBTRV REL	CR- KEPT	RBTAD REL	CR- KEPT	CT REL	CR- KEPT	CTAD REL	CR- KEPT	LMB REL	CR- KEPT	SMB REL
1	Weekday	0.12	0.87	0.99	0.01	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.02	0.02	0.50
	Weekend	0.12	0.77	0.89	0.04	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.04	0.00	0.43
2	Weekday	0.36	1.30	1.66	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.04	0.00	0.38
	Weekend	0.07	1.02	1.09	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.16	0.01	0.72
3	Weekday	0.33	0.73	1.07	0.01	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.02	0.00	0.00	0.01	0.14	0.01	0.30
	Weekend	0.28	0.60	0.88	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.60
4	Weekday	0.13	0.93	1.05	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.22	0.02	0.45
	Weekend	0.09	0.69	0.77	0.02	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.00	0.00	0.00	0.06	0.03	0.46
5	Weekday	0.11	0.60	0.71	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.07	0.00	0.28
	Weekend	0.18	0.19	0.37	0.03	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.05	0.05	0.08
6	Weekday	1.26	0.70	1.96	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.05	0.00	0.15
	Weekend	0.07	0.36	0.43	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.16
7	Weekday	0.14	0.79	0.93	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.42	0.00	0.00
	Weekend	0.13	0.32	0.45	0.02	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.03
8	Weekday	0.04	0.62	0.66	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.21	0.00	0.00
	Weekend	0.10	0.53	0.63	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.09	0.00	0.03
9	Weekday	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Weekend	0.42	0.10	0.51	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.00	0.00
10	Weekday	0.00	0.55	0.55	0.00	0.55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Weekend	0.10	0.20	0.31	0.05	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	Weekday	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Weekend	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1	wkdy CR:	0.23	0.64	0.87	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.11	0.00	0.19
1	wknd CR:	0.14	0.44	0.58	0.02	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.04	0.01	0.23
1	Sson CR:	0.20	0.58	0.79	0.01	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.09	0.01	0.20

	Season CR:	0.23	0.64	0.87	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.11	0.00	0.19
	Season CR:	0.14	0.44	0.05	0.02	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.04	0.01	0.23
	Season CR:	0.20	0.58	0.79	0.01	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.09	0.01	0.20

f Report.

Appendix G. Summary of fishing effort and harvest for Hayden Lake, Idaho, February 1 - June 30, 1995.

Idaho Department of Fish and Game
Creel Survey System
Pressure Report by Interval and Daytype
Summary

Body of Water: HAYDEN LAKE Year: 0 EPA Number: 1111111

SECTION NUMBER	INTERVAL	DAYTYPE	BOAT ANGLERS HOURS	BANK ANGLERS HOURS	TUBE ANGLERS HOURS	ICE ANGLERS HOURS	TOTAL ANGLERS HOURS
1	1	Weekday	71	940	0	118	1128
		Weekend	47	451	0	385	884
	Interval 1 totals:		118	1391	0	503	2012
	+/- at 95% C.I.:		119	845	0	354	924
1	2	Weekday	383	1188	0	172	1742
		Weekend	475	725	0	388	1588
	Interval 2 totals:		858	1913	0	560	3330
	+/- at 95% C.I.:		688	1283	0	507	1542
1	3	Weekday	304	911	0	0	1215
		Weekend	162	558	0	0	720
	Interval 3 totals:		466	1469	0	0	1935
	+/- at 95% C.I.:		269	457	0	0	530
1	4	Weekday	998	1793	0	0	2791
		Weekend	716	1193	0	0	1908
	Interval 4 totals:		1714	2986	0	0	4699
	+/- at 95% C.I.:		724	665	0	0	983
1	5	Weekday	1709	2113	0	0	3822
		Weekend	1115	1646	0	0	2761
	Interval 5 totals:		2824	3759	0	0	6583
	+/- at 95% C.I.:		1452	1499	0	0	2087
1	6	Weekday	1038	1180	0	0	2218
		Weekend	4262	1408	0	0	5670
	Interval 6 totals:		5300	2588	0	0	7888
	+/- at 95% C.I.:		2907	779	0	0	3010
1	7	Weekday	1767	1131	0	0	2898

Idaho Department of Fish and Game
Creel Survey System
Summary for Harvest by Section and Interval

Body of Water: HAYDEN LAKE | Year of Census: 0 | EPA Number: 1111111

SEC NUM	INT	DY CD	FISH KEPT	FISH RELEASED	FISH CAUGHT	RBT	CT	LMB	SMB	BC	PE	PIKE	RBTLV
1	1	1	46	11	58	23	0	0	0	0	0	0	0
		2	168	0	168	12	0	0	0	0	12	139	0
Int 1 Tot:			214	11	226	35	0	0	0	0	12	139	0
+/- 95%CI:			139	8	141	40	0	0	0	0	26	124	0
1	2	1	186	7	193	14	0	0	0	0	0	172	0
		2	191	8	199	33	16	0	0	0	0	141	0
Int 2 Tot:			377	15	392	47	16	0	0	0	0	313	0
+/- 95%CI:			264	7	271	39	33	0	0	0	0	248	0
1	3	1	50	9	57	33	9	0	0	0	0	9	0
		2	63	0	63	21	21	0	0	0	0	0	21
Int 3 Tot:			113	9	120	54	30	0	0	0	0	9	21
+/- 95%CI:			188	3	189	68	42	0	0	0	0	3	42
1	4	1	142	282	424	95	11	0	0	0	0	11	0
		2	61	40	103	21	21	0	0	0	0	8	8
Int 4 Tot:			203	322	527	116	32	0	0	0	0	19	8
+/- 95%CI:			113	84	428	63	7	0	0	0	0	4	2
1	5	1	248	69	317	54	0	0	0	0	0	157	0
		2	149	141	287	141	8	0	0	0	0	8	17
Int 5 Tot:			397	210	604	195	8	0	0	0	0	165	17
+/- 95%CI:			289	77	376	144	4	0	0	0	0	212	8
1	6	1	151	505	654	113	0	0	0	0	0	18	0
		2	102	284	386	34	17	0	0	0	17	17	17
Int 6 Tot:			253	790	1040	147	17	0	0	0	17	35	17
+/- 95%CI:			165	205	783	115	9	0	0	0	9	45	9
1	7	1	614	817	1432	35	12	0	0	385	61	61	0
		2	242	680	921	50	0	0	0	76	65	40	0

Date: 07/07/95
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Time: 10:27:35 am

Idaho Department of Fish and Game
Creel Survey System
Pressure Report by Interval and Daytype
Summary

Body of Water: HAYDEN LAKE   Year: 0 EPA Number: 1111111

SECTION NUMBER	INTERVAL	DAYTYPE	BOAT ANGLERS HOURS	BANK ANGLERS HOURS	TUBE ANGLERS HOURS	ICE ANGLERS HOURS	TOTAL ANGLERS HOURS
1	7	Weekend	3259	1742	34	0	5035
	Interval 7 totals:		5026	2873	34	0	7933
	+/- at 95% C.I.:		1427	628	67	0	1560
1	8	Weekday	1898	1358	0	0	3256
		Weekend	1760	1035	0	0	2795
	Interval 8 totals:		3658	2393	0	0	6051
	+/- at 95% C.I.:		1134	997	0	0	1511
1	9	Weekday	1172	931	0	0	2103
		Weekend	2921	1540	0	0	4461
	Interval 9 totals:		4093	2471	0	0	6564
	+/- at 95% C.I.:		1127	1625	0	0	1978
1	10	Weekday	1883	668	0	0	2550
		Weekend	1878	1246	0	0	3124
	Interval 10 totals:		3761	1914	0	0	5674
	+/- at 95% C.I.:		1263	528	0	0	1369
1	11	Weekday	2496	756	0	0	3252
		Weekend	1088	288	0	0	1296
	Interval 11 totals:		3584	1044	0	0	4548
	+/- at 95% C.I.:		1002	562	0	0	1140
	Section 1 totals:		31322	24801	34	1063	57217
	+/- at 95% C.I.:		4340	3239	67	619	5451
	Season totals:		31322	24801	34	1063	57217
	+/- at 95% C.I.:		4340	3239	67	619	5451

End of Report.

Date: 07/27/95 Time: 10:3[illegible]:25 am

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Idaho Department of Fish and Game

Creel Survey System

Summary for Harvest by Section and Interval

Body of Water: HAYDEN LAKE Year of Census: 0 EPA Number: 1111111

SEC NUM	INT	DY CD	RBTRV	RBTRD	CTRD	SPLAKE	SUNFISH	OTHER	ANY
1	1	1	11	11	0	0	0	0	0
		2	4	0	0	0	0	0	0
Int 1 Tot:			15	11	0	0	0	0	0
+/- 95%CI:			24	24	0	0	0	0	0
1	2	1	0	0	0	0	0	0	0
		2	0	0	0	0	0	0	0
Int 2 Tot:			0	0	0	0	0	0	0
+/- 95%CI:			0	0	0	0	0	0	0
1	3	1	0	0	0	0	0	0	0
		2	0	0	0	0	0	0	0
Int 3 Tot:			0	0	0	0	0	0	0
+/- 95%CI:			0	0	0	0	0	0	0
1	4	1	11	0	0	0	0	11	0
		2	8	0	0	0	0	0	0
Int 4 Tot:			19	0	0	0	0	11	0
+/- 95%CI:			4	0	0	0	0	3	0
1	5	1	0	0	0	0	0	0	0
		2	0	0	0	0	0	0	0
Int 5 Tot:			0	0	0	0	0	0	0
+/- 95%CI:			0	0	0	0	0	0	0
1	6	1	0	0	0	0	0	0	0
		2	0	0	0	0	0	0	0
Int 6 Tot:			0	0	0	0	0	0	0
+/- 95%CI:			0	0	0	0	0	0	0
1	7	1	0	0	0	0	0	0	0
		2	0	0	0	0	0	0	0

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Idaho Department of Fish and Game
Creel Survey System
Summary for Harvest by Section and Interval

Body of Water: HAYDEN LAKE   Year of Census: 0   EPA Number: 1111111

SEC NUM	INT	DY CD	FISH KEPT	FISH RELEASED	FISH CAUGHT	RBT	CT	LMB	SMB	BC	PE	PIKE	RBTLV
Int 7 Tot:			856	1497	2353	85	12	0	0	461	126	101	0
+/- 95%CI:			755	358	1433	117	4	0	0	737	156	63	0
1	8	1	1055	5643	6698	62	0	0	0	0	869	62	0
		2	212	1965	2175	45	14	0	0	128	14	14	0
Int 8 Tot:			1267	7608	8873	107	14	0	0	128	883	76	0
+/- 95%CI:			1400	2011	9900	129	5	0	0	165	1298	132	0
1	9	1	179	940	1119	0	0	0	0	0	0	0	0
		2	665	1918	2583	27	0	0	0	27	540	49	0
Int 9 Tot:			844	2858	3702	27	0	0	0	27	540	49	0
+/- 95%CI:			1025	863	1801	9	0	0	0	9	912	91	0
1	10	1	533	1104	1637	115	0	0	0	0	18	0	0
		2	122	984	1106	41	9	0	0	9	0	9	0
Int10 Tot:			655	2088	2743	156	9	0	0	9	18	9	0
+/- 95%CI:			801	518	1688	106	3	0	0	3	51	3	0
1	11	1	234	2728	2959	140	46	0	0	0	0	0	0
		2	0	616	616	0	0	0	0	0	0	0	0
Int11 Tot:			234	3344	3575	140	46	0	0	0	0	0	0
+/- 95%CI:			262	870	1906	165	66	0	0	0	0	0	0
Sec 1 Tot:			5413	18752	24155	1109	184	0	0	617	1596	915	63
+/-95% CI:			2125	2448	10522	337	86	0	0	755	1595	392	44
Seasn Tot:			5413	18752	24155	1109	184	0	0	617	1596	915	63
+/-95% CI:			2125	2448	10522	337	86	0	0	755	1595	392	44

End of Report.

Date: 07/27/95
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Time: 3:40:39 pm

Idaho Department of Fish and Game
Creel Survey System
Summary for Catch Rate by Day Type and Interval - for Total hours

Body of Water: HAYDEN LAKE   1985   EPA Number: 1111111

SEC	INT	DAYTYPE	CR KEPT	CR RELSD	CR CONT	CR-KEPT	RBT REL	CR-KEPT	CT REL	CR-KEPT	LMB REL	CR-KEPT	SMB REL	CR-KEPT	BC REL	CR-KEPT	PE REL	CR-KEPT	PIKE REL	CR-KEPT	[illegible] REL
1	1	Weekday	0.24	0.01	0.05	0.02	0.01	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.03	0.00	0.00	0.02	0.00	0.00	0.00
		Weekend	0.19	0.00	0.19	0.01	0.00	0.00	0.03	0.00	0.00	0.02	0.02	0.00	0.00	0.01	0.00	0.16	0.00	0.00	0.00
	2	Weekday	0.11	0.00	0.11	0.01	0.22	0.00	0.03	0.02	0.00	0.00	0.03	0.00	0.02	0.02	0.02	0.10	0.00	0.02	0.22
		Weekend	0.12	0.01	0.13	0.02	0.01	0.01	0.03	0.00	0.02	0.02	0.02	0.00	0.00	0.00	0.00	0.05	0.03	0.02	0.02
	3	Weekday	0.04	0.01	0.05	0.03	0.00	0.01	0.01	0.03	0.00	0.02	0.00	0.00	0.03	0.02	0.02	0.01	0.00	0.02	0.00
		Weekend	0.09	0.00	0.09	0.03	0.00	0.03	0.00	0.02	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00
	4	Weekday	0.35	0.10	0.15	0.03	0.01	0.00	0.00	0.00	0.07	0.00	0.02	0.02	0.03	0.02	0.03	0.00	0.02	0.02	0.00
		Weekend	0.03	0.22	0.25	0.21	0.02	0.01	0.03	0.07	0.01	0.02	0.00	0.02	0.02	0.02	0.00	0.02	0.00	0.01	0.02
	5	Weekday	0.07	0.02	0.03	0.01	0.01	0.00	0.01	0.00	0.02	0.00	0.02	0.02	0.00	0.00	0.02	0.04	0.00	0.02	0.00
		Weekend	0.05	0.05	0.10	0.05	0.03	0.03	0.02	0.20	0.01	0.00	0.01	0.00	0.01	0.03	0.02	0.00	0.02	0.01	0.00
	6	Weekday	0.27	0.22	0.32	0.05	0.02	0.00	0.01	0.02	0.16	0.02	0.03	0.00	0.00	0.02	0.02	0.01	0.01	0.00	0.03
		Weekend	0.22	0.05	0.07	0.01	0.01	0.00	0.02	0.02	0.21	0.03	0.00	0.02	0.02	0.00	0.00	0.00	0.00	0.02	0.02
	7	Weekday	0.21	0.25	0.45	0.21	0.02	0.22	0.22	0.00	0.05	0.00	0.00	0.12	0.11	0.02	0.11	0.02	0.00	0.00	0.00
		Weekend	0.05	0.14	0.18	0.01	0.00	0.00	0.01	0.02	0.08	0.03	0.01	0.02	0.01	0.01	0.02	0.01	0.01	0.02	0.02
	8	Weekday	0.32	1.73	2.05	0.02	0.02	0.00	0.00	0.02	0.18	0.00	0.02	0.00	0.02	3.27	1.41	0.02	0.02	0.02	0.00
		Weekend	0.05	0.70	0.75	0.02	0.00	0.01	0.00	0.02	0.15	0.00	0.10	0.04	0.16	0.01	0.11	0.01	0.02	0.00	0.02
	9	Weekday	0.09	0.45	0.53	0.02	0.02	0.02	0.00	0.00	0.05	0.00	0.33	0.00	0.02	0.00	0.23	0.02	0.00	0.00	0.00
		Weekend	0.15	0.43	0.58	0.21	0.01	0.00	0.01	0.00	0.12	0.00	0.02	0.21	0.07	0.12	0.22	0.21	0.03	0.00	0.00
	10	Weekday	0.21	0.43	0.64	0.05	0.01	0.03	0.03	0.00	0.11	0.02	0.13	0.00	0.02	0.01	0.23	0.03	0.22	0.00	0.02
		Weekend	0.04	0.22	0.25	0.01	0.01	0.00	0.22	0.22	0.00	0.30	0.19	0.00	0.02	0.02	0.23	0.03	0.00	0.02	0.02
	11	Weekday	0.07	0.84	0.91	0.04	0.09	0.01	0.04	0.08	0.19	0.03	0.27	0.00	0.15	0.02	0.02	0.02	0.01	0.00	0.00
		Weekend	0.00	0.45	0.45	0.00	0.02	0.22	0.02	0.02	0.05	0.00	0.02	0.20	0.01	0.00	0.21	0.01	0.01	0.02	0.02
Sec 1 wkdy CR:			0.12	0.37	0.49	0.02	0.01	0.00	0.01	0.00	0.07	0.00	0.07	0.01	0.03	0.03	0.14	0.02	0.00	0.00	0.00
Sec 1 wknd CR:			0.07	0.20	0.27	0.02	0.02	0.01	0.01	0.00	0.05	0.03	0.03	0.01	0.05	0.01	0.22	0.02	0.00	0.00	0.02
Sec 1 Sson CR:			0.12	0.32	0.43	0.02	0.01	0.00	0.21	0.00	0.06	0.02	0.05	0.01	0.02	0.02	0.11	0.02	0.02	0.02	0.02

Wkdy Season CR:	0.12	0.37	0.49	0.02	0.01	0.00	0.01	0.00	0.07	0.02	0.07	0.01	0.02	0.03	0.14	0.02	0.00	0.00	0.02
Wknd Season CR:	0.07	0.20	0.22	0.02	0.02	0.01	0.01	0.00	0.25	0.02	0.03	0.01	0.05	0.01	0.22	0.03	0.00	0.00	0.00
Ave Season CR:	0.10	0.32	0.43	0.02	0.01	0.00	0.01	0.02	0.06	0.02	0.05	0.01	0.02	0.02	0.11	0.23	0.02	0.02	0.02

End of Report.

Date: 07/07/95 Time: 10:36:39 am
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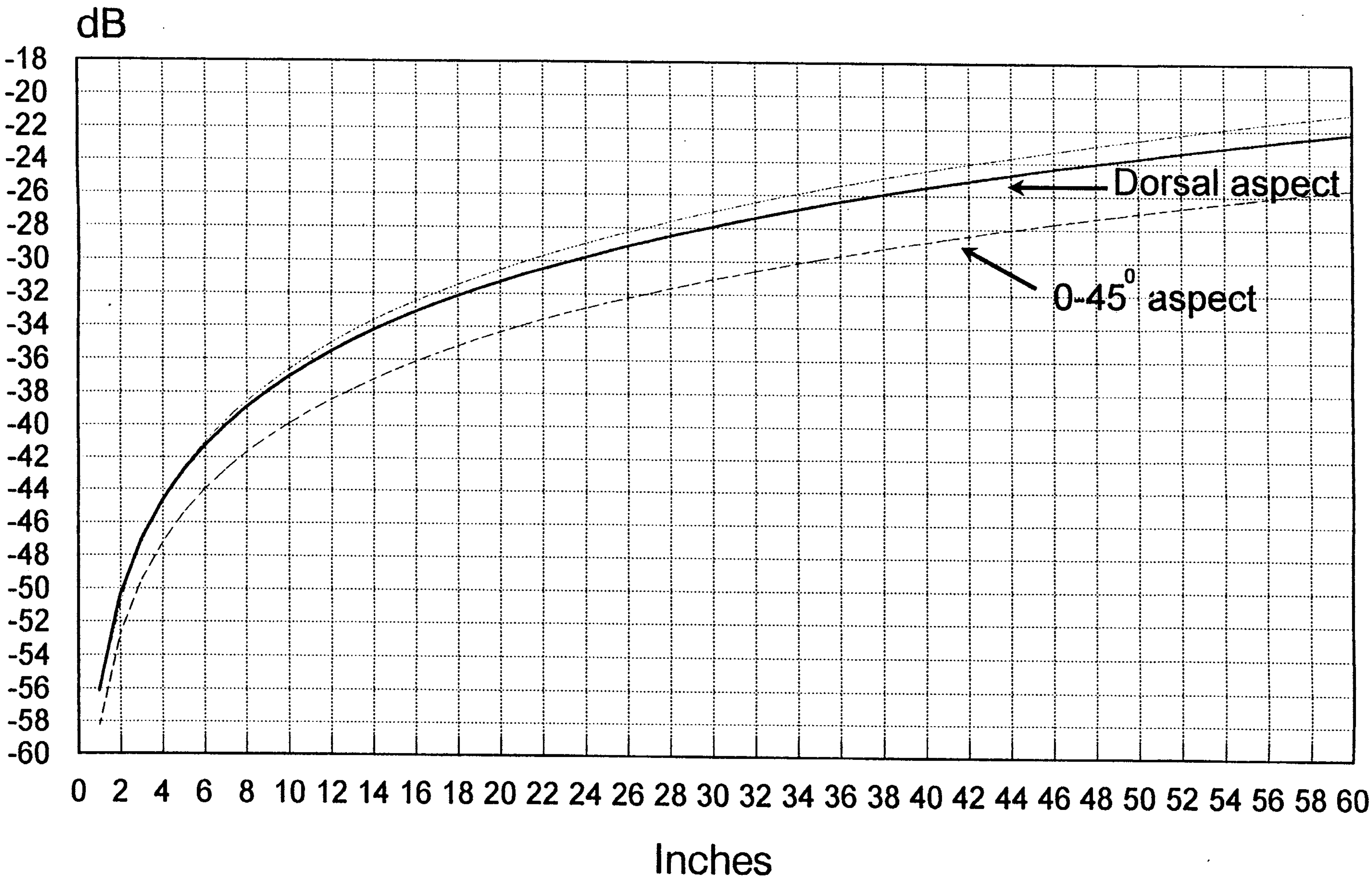
Idaho Department of Fish and Game
Creel Survey System
Summary for Harvest by Section and Interval

Body of Water: HAYDEN LAKE Year of Census: 0 EPA Number: 1111111

SEC NUM	INT	DY CD	RBTRV	RBTAD	CTAD	SPLAKE	SUNFISH	OTHER	ANY
Int 7 Tot:			0	0	0	0	0	0	0
+/- 95%CI:			0	0	0	0	0	0	0
1	8	1	0	0	0	0	0	0	0
		2	0	0	0	0	0	0	0
Int 8 Tot:			0	0	0	0	0	0	0
+/- 95%CI:			0	0	0	0	0	0	0
1	9	1	0	0	0	0	0	0	0
		2	0	0	0	0	0	0	0
Int 9 Tot:			0	0	0	0	0	0	0
+/- 95%CI:			0	0	0	0	0	0	0
1	10	1	0	0	0	0	0	0	0
		2	0	0	0	0	0	0	0
Int10 Tot:			0	0	0	0	0	0	0
+/- 95%CI:			0	0	0	0	0	0	0
1	11	1	0	0	0	0	0	0	0
		2	0	0	0	0	0	0	0
Int11 Tot:			0	0	0	0	0	0	0
+/- 95%CI:			0	0	0	0	0	0	0
Sec 1 Tot:			34	11	0	0	0	11	0
+/-95% CI:			24	24	0	0	0	3	0
Seasn Tot:			34	11	0	0	0	11	0
+/-95% CI:			24	24	0	0	0	3	0

End of Report.

Appendix H. Simrad EY500 echosounder decibel (dB) rating chart relating decibel level to fish length.



Appendix I. Summary of lake survey data collected from Swan Lake, Idaho, 1995.

LOWLAND LAKES AND RESERVOIRS FISH SURVEY
COVER SHEET

LAKE/RESERVOIR NAME: SWAN LAKE **REGION:** PANHANDLE

DATE: 8-21-95 **SAMPLE CREW:** ______________

SCALE ENVELOPE NUMBERS: __________ **TO** __________

SAMPLING CONDITIONS:

Water Temp. (°C @ .5 m): 22.4 Air Temp. Range (°C): _____ to _____

Secchi Range (m): 2M to _____

Wind (may circle more than one): 0-10 10-20 20+ mph

N NE E SE S SW W NW

SAMPLING EFFORT:

Combined floating and sinking gill net: 3 nights

Electrofishing: 1 hours; trap net: 2 nights

Other (including add'l size selective sampling): ______________

____

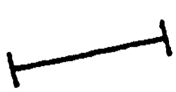
SAMPLING LOCATIONS:

Draw or attach a lake/reservoir map and indicate fisheries and limnological sampling locations; footnoting with narrative if necessary.

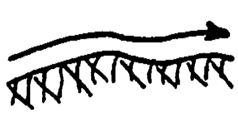
KEY:

 Trap Net

S-X Secchi reading

 Gill Net (F,S,FS)

TDO-X Surface/bottom and profile readings

 Electrofishing

LOWLAND LAKES AND RESERVOIRS
STANDARD DATA BASE

WATER AREA CHARACTERISTICS

Lake/Reservoir Name: SWAN LAKE Region: PANHANDLE

Date: 8/21/95 Person Completing Form: ____________________

Hydrological Unit: ____________________ Catalogue No.: ____________________

Type of Water: X Natural ___ Man-made ___ Impounded Natural

Full Pool: Volume __________ (acre ft.) Area 370 (acres)

Elevation 2128 (ft.) Maximum Depth 18 (ft.)

Minimum Pool: Volume __________ (acre ft.) Elevation 2121 (ft.)

Mean Annual Inflow (or Outflow): __________ (acre ft.)

Trophic Status: __Oligotrophic X Mesotrophic __Eutrophic MEI($\sqrt{(TDS)_{/d}}$):______

Shoreline Length: __________ (km)

Approximate % Shoreline in:

Urban	Agriculture	Range	Forest	Wetland
5			20	75

Approximate % Shoreline Ownership:

Federal	State	Private
	25	75

Known Winter Kills?: X No ___ Yes ____________________ (years)

Littoral Zone Substrate:

______ Bedrock + ______ Boulder/Rubble + ______ Gravel + ______ Sand + 100 Silt/Mud/Detritus = 100%

Littoral Zone Cover: Total 75 %

______ Large Organic Debris + ______ Docks + ______ Boulder/Rubble + 100 Vegetation = 100%

LOWLAND LAKES AND RESERVOIRS
STANDARD DATA BASE

LIMNOLOGICAL CHARACTERISTICS
(To be measured during July 20-Sept. 10 period.
Measurement locations to be indicated on file map.)

LAKE/RESERVOIR NAME: SWAN LAKE **REGION:** PANHANDLE

DATE: 8-21-95 **PERSON COMPLETING FORM:** ____________

MINIMUM DATA SET:

pH: 7.1 (surface) ______ (bottom)   Total alkalinity (ppm): 100 (surface) ______ (bottom)

HARDNESS 80 ______

Conductivity (μmhos): 38 (surface)

Secchi (m): 2m (location 1), ______ (location 2), ______ (location 3), ______ (location 4) = ______ (mean)

Temperature and D.O. profile:
(measured at 1-m increments or 10 depth intervals)

Temperature (°C):	22.4	24.3	19.8	19.3	19.0	18.6	18.4			
D.O. (ppm):	8.3	7.6	8.0	7.9	7.4	6.9	6.1			
Depth (m):	0	1	2	3	4	5	6			

Volume of trout habitat (<21°C, >5 ppm D.O.): ______ m^3

Trout habitat as a percent of full pool volume: ______ %

OPTIONAL ADDITIONAL DATA:

Chlorophyll a (μ g/L): ______ Total phosphates (mg/L): ______

T.D.S. (mg/L): ______ Nitrate nitrogen (mg/L): ______

Zooplankton (no/L >____): ______

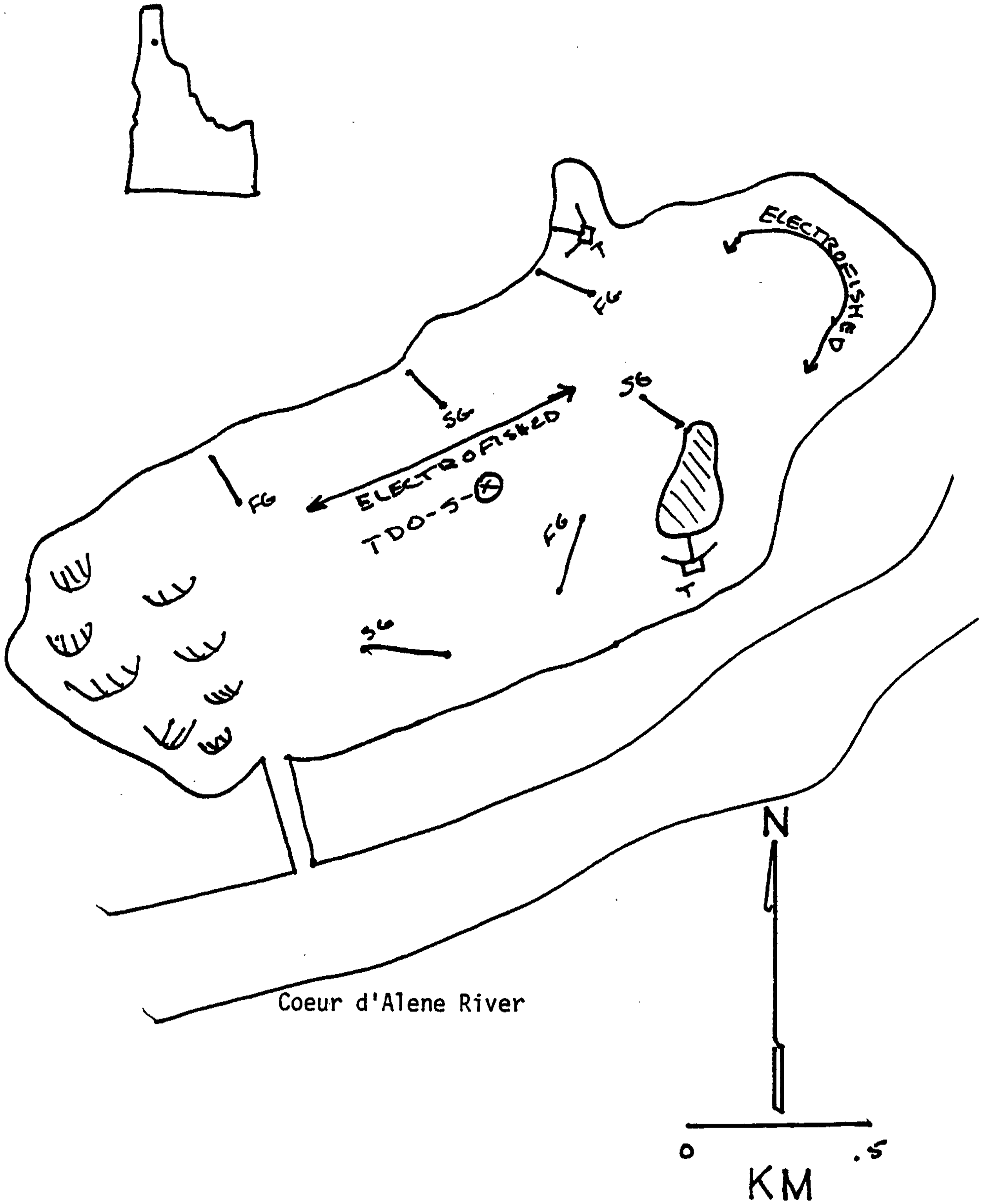


Figure S1. Location of fish and limnological sampling sites on Swan Lake, Idaho, 1995.

LOWLAND LAKES AND RESERVOIRS FISH SURVEY
AGE AND GROWTH SUMMARY SHEET

LAKE/RESERVOIR NAME: SWAN LAKE REGION: PANHANDLE

DATE OF COLLECTION: 7-18-95

SPECIES Largemouth bass

Age group	Number aged	Back calculated length (mm) at each annulus							Length at capture
		I	II	III	IV	V	VI	VII	
0	0								
I	14	70.88							107.7
II	3	63.93	134.24						175.7
III	16	64.46	124.80	188.50					219.8
IV	10	66.11	143.71	204.33	244.08				267.1
V	12	59.23	117.36	164.80	199.62	229.50			247.3
VI	2	71.04	154.05	197.05	253.07	285.29	301.45		316
VII	3	76.20	149.98	202.52	234.99	271.66	297.64	318.25	347
Average length		65.97	130.5	186.94	223.98	243.5	299.16	318.25	
Number aged		60	46	43	27	17	5	3	

SPECIES:

Age group	Number aged	Back calculated length (mm) at each annulus							Length at capture
		I	II	III	IV	V	VI	VII	
0									
I									
II									
III									
IV									
V									
VI									
VII									
Average length									
Number aged									

SPECIES:

Age group	Number aged	Back calculated length (mm) at each annulus							Length at capture
		I	II	III	IV	V	VI	VII	
0									
I									
II									
III									
IV									
V									
VI									
VII									
Average length									
Number aged									

LOWLAND LAKES AND RESERVOIRS
STANDARD DATA BASE

FISH COMMUNITY CHARACTERISTICS

LAKE/RESERVOIR NAME: SWAN LAKE REGION: 1 DATE: 7/19/95

Catch Per Unit* of Combined Gear Sampling Effort

SPECIES	LENGTH - RANGE(mm)	No.	%	Wt.(kg)	%
LMB	38 - 400	71	37	12.65	33
NP	472 - 700	5	3	5.41	14
PE	80 - 231	32	17	1.56	4
BC	115 - 285	10	5	1.96	5
PS	44 - 172	37	19	1.43	3
BH	190 - 262	17	9	2.74	7
	-				
	-				
	-				
	-				
	-				
GAME FISH SUBTOTAL:		172	89	25.72	67
TENCH	310 - 410	21	11	12.4	33
	-				
	-				
	-				
	-				
	-				
	-				
	-				
	-				
	-				
	-				
	-				
NON-GAME FISH SUBTOTAL:		21	11	12.4	33
ALL SPECIES TOTAL:		193	100%	38.12	100%

* one hour electrofishing, one trap net night, and one combined floating and sinking gill net night.

DATA SHEET (1 of 5)

LAKE/RESERVOIR NAME: SWAN LAKE **REGION:** PANHANDLE

DATE: 7-17-95 **SAMPLE CREW LEADER:**

Length range	Species LMB								
(mm)	G.N.	T.N.	E.F.	Add'l	(mm)	G.N.	T.N.	E.F.	Add'l
<79			8		370-379				
80-89					380-389				
90-99			3		390-399				
100-109			2		400-409	1			
110-119			5		410-419				
120-129			3		420-429				
130-139					430-439				
140-149					440-449				
150-159					450-459				
160-169			1		460-469				
170-179			1		470-479				
180-189			1		480-489				
190-199	1				490-499				
200-209			1		500-509				
210-219			5		510-519				
220-229			4		520-529				
230-239	1		4		530-539				
240-249	1		3		540-549				
250-259	1		3		550-559				
260-269			3		560-569				
270-279	1		4		570-579				
280-289			2		580-589				
290-299	2		1		590-599				
300-309	1		1		600-609				
310-319					610-619				
320-329					620-629				
330-339			2		Batch:				
340-349			1		Size				
350-359	1				Number	10	59		
360-369					Tot.Wt.				

DATA SHEET (2 of 3)

LAKE/RESERVOIR NAME: SWAN LAKE REGION: PANHANDLE

DATE: 7-17-95 SAMPLE CREW LEADER:

Length range	Species Northern Pike								
(mm)	G.N.	T.N.	E.F.	Add'l	(mm)	G.N.	T.N.	E.F.	Add'l
					370-379				
					380-389				
					390-399				
					400-409				
110-119					410-419				
120-129					420-429				
130-139					430-439				
140-149					440-449				
150-159					450-459				
160-169					460-469				
170-179					470-479			1	
180-189					480-489				
190-199					490-499	1			
200-209					500-509	1			
210-219					510-519				
220-229					520-529	1			
230-239					530-539				
240-249					540-549				
250-259					550-559				
260-269					560-569				
270-279					570-579				
280-289					580-589				
290-299					590-599				
300-309					600-609				
310-319					610-619				
320-329					~~620-629~~ 700	1			
330-339					Batch:				
340-349					Size				
350-359					Number				
360-369					Tot.Wt.				

DATA SHEET (3 of 5)

LAKE/RESERVOIR NAME: SWAN LAKE REGION: PANHANDLE

DATE: 7-17-95 SAMPLE CREW LEADER:

Length range	Species TENCH								
(mm)	G.N.	T.N.	E.F.	Add'l	(mm)	G.N.	T.N.	E.F.	Add'l
					370-379	2		1	
					380-389				
					390-399	1			
					400-409				
110-119					410-419		4		
120-129					420-429				
130-139					430-439				
140-149					440-449				
150-159					450-459				
160-169					460-469				
170-179					470-479				
180-189					480-489				
190-199					490-499				
200-209					500-509				
210-219					510-519				
220-229					520-529				
230-239					530-539				
240-249					540-549				
250-259					550-559				
260-269					560-569				
270-279					570-579				
280-289					580-589				
290-299					590-599				
300-309					600-609				
310-319	1				610-619				
320-329	2				620-629				
330-339	1				Batch:				
340-349	1	2			Size				
350-359	3	2	1		Number				
360-369	2	1			Tot.Wt.				

DATA SHEET (4 of 5)

LAKE/RESERVOIR NAME: SWAN LAKE REGION: PANHANDLE

DATE: 7-17-95 SAMPLE CREW LEADER:

Length range	Species Pumpkinseed				Species Br Bullhead			
(mm)	G.N.	T.N.	E.F.	Add'l	G.N.	T.N.	E.F.	Add'l
< 79			14					
80-89			1					
90-99			5					
100-109			4					
110-119			1					
120-129								
130-139			1					
140-149			3					
150-159			3					
160-169			3					
170-179			2					
180-189								
190-199					1			
200-209					3		1	
210-219					1	1		
220-229					1			
230-239					5		1	
240-249								
250-259					2		2	
260-269							1	
270-279								
280-289								
290-299								
300-309								
310-319								
320-329								
330-339								
340-349								
Batch Samples:								
Size Range								
Numbers								
Total Weight								

DATA SHEET (5 of 5)

LAKE/RESERVOIR NAME: SWAN LAKE REGION: PANHANDLE

DATE: 7-17-95 SAMPLE CREW LEADER:

Length range	Species PERCH				Species BLACK CRAPPIE			
(mm)	G.N.	T.N.	E.F.	Add'l	G.N.	T.N.	E.F.	Add'l
< 79								
80-89			1					
90-99			3					
100-109			4					
110-119			4		1			
120-129			1					
130-139			2					
140-149			3					
150-159	1		2					
160-169	1		2					
170-179			2					
180-189			2					
190-199			2					
200-209			1					
210-219					1			
220-229					4			
230-239			1		3			
240-249								
250-259								
260-269								
270-279								
280-289					1			
290-299								
300-309								
310-319								
320-329								
330-339								
340-349								
Batch Samples:								
Size Range								
Numbers								
Total Weight								

Appendix J. Summary of lake survey data collected from Black Lake, Idaho, 1995.

LOWLAND LAKES AND RESERVOIRS FISH SURVEY
COVER SHEET

LAKE/RESERVOIR NAME: BLACK LAKE **REGION:** PANHANDLE

DATE: 7-19-95 **SAMPLE CREW:** ____________

SCALE ENVELOPE NUMBERS: ____________ **TO** ____________

SAMPLING CONDITIONS:

Water Temp. (°C @ .5 m): 21.6 Air Temp. Range (°C): ______ to ______

Secchi Range (m): 2.3 to ______

Wind (may circle more than one): 0-10 10-20 20+ mph

N NE E SE S SW W NW

SAMPLING EFFORT:

Combined floating and sinking gill net: 3 nights

Electrofishing: 0.5 hours; trap net: 2 nights

Other (including add'l size selective sampling): ____________

SAMPLING LOCATIONS:
Draw or attach a lake/reservoir map and indicate fisheries and limnological sampling locations; footnoting with narrative if necessary.

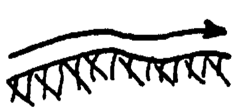
KEY:


Trap Net

S-X Secchi reading


Gill Net (F,S,FS)

TDO-X Surface/bottom and profile readings


Electrofishing

LOWLAND LAKES AND RESERVOIRS
STANDARD DATA BASE

WATER AREA CHARACTERISTICS

Lake/Reservoir Name: BLACK LAKE Region: PANHANDLE

Date: 8/21/95 Person Completing Form: ____________

Hydrological Unit: ____________ Catalogue No.: ____________

Type of Water: X Natural ___ Man-made ___ Impounded Natural

Full Pool: Volume ________ (acre ft.) Area 350 (acres)

Elevation 2128 (ft.) Maximum Depth 21.3 (ft.)

Minimum Pool: Volume ________ (acre ft.) Elevation 2121 (ft.)

Mean Annual Inflow (or Outflow): ________ (acre ft.)

Trophic Status: __Oligotrophic X Mesotrophic __Eutrophic MEI($\sqrt{(TDS)_{/d}}$):______

Shoreline Length: ________ (km)

Approximate % Shoreline in:

Urban	Agriculture	Range	Forest	Wetland
5	5		90	

Approximate % Shoreline Ownership:

Federal	State	Private
		100

Known Winter Kills?: X No ___ Yes ____________ (years)

Littoral Zone Substrate:

Bedrock	Boulder/Rubble	Gravel	Sand	Silt/Mud/Detritus	
	+ 15	+	+	+ 85	= 100%

Littoral Zone Cover: Total 25 %

Large Organic Debris	Docks	Boulder/Rubble	Vegetation	
	+	+ 15	+ 85	= 100%

LOWLAND LAKES AND RESERVOIRS
STANDARD DATA BASE

LIMNOLOGICAL CHARACTERISTICS
(To be measured during July 20-Sept. 10 period. Measurement locations to be indicated on file map.)

LAKE/RESERVOIR NAME: Black Lake **REGION:** Panhandle

DATE: 8-21-95 **PERSON COMPLETING FORM:** ______

MINIMUM DATA SET:

pH: 7.3 (surface) — (bottom)

Hardness (ppm): 100
Total alkalinity (ppm): 100 (surface) — (bottom)

Conductivity (µmhos): 58 (surface)

Secchi (m): 2.3 (location 1), – (location 2), – (location 3), – (location 4) = 2.3m (mean)

Temperature and D.O. profile:
(measured at 1-m increments or 10 depth intervals)

Temperature (°C):	surface 21.6	20.8	19.9	19.3	18.9	18.4	18.2	18.1		
D.O. (ppm):	surface 8.8	8.8	9.3	9.1	9.1	5.9	2.9	1.6		
Depth (m):	Surface	1	2	3	4	5	6	6.5		

Volume of trout habitat (<21°C, >5 ppm D.O.): ______ m^3

Trout habitat as a percent of full pool volume: ______ %

OPTIONAL ADDITIONAL DATA:

Chlorophyll a (µ g/L): ______ Total phosphates (mg/L): ______

T.D.S. (mg/L): ______ Nitrate nitrogen (mg/L): ______

Zooplankton (no/L >____): ______

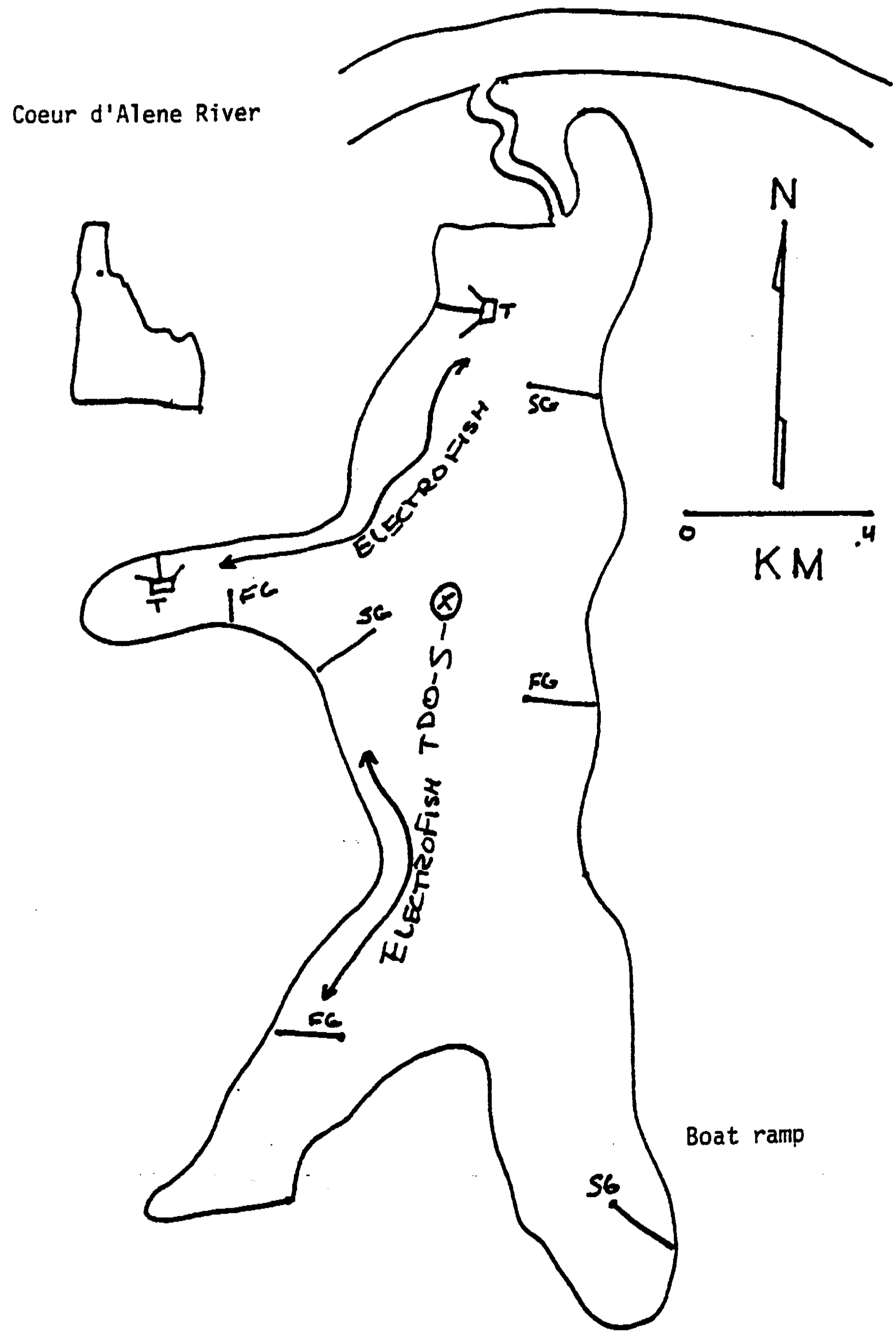


Figure B1. Location of fish and limnological sampling sites on Black Lake, Idaho, 1995.

LOWLAND LAKES AND RESERVOIRS
STANDARD DATA BASE

FISH COMMUNITY CHARACTERISTICS

LAKE/RESERVOIR NAME: BLACK LAKE REGION: 1 DATE: 7/19/95

Catch Per Unit* of Combined Gear Sampling Effort

SPECIES	LENGTH - RANGE(mm)	No.	%	Wt.(kg)	%
LMB	89 - 510	156	32	9.9	14
NP	530 - 690	3	0.6	4.6	6
PF	90 - 240	146	30	11.0	15
BC	100 - 260	74	15	3.1	4
PS	60 - 150	19	4	0.5	0.7
BH	190 - 260	18	4	3.2	4
KOK	160 - 260	7	1	0.6	.8
	-				
	-				
	-				
	-				
GAME FISH SUBTOTAL:		423	88	32.9	46
TENCH	350 - 450	49	10	36.9	
Squawfish	240 - 420	9	2	2.5	
	-				
	-				
	-				
	-				
	-				
	-				
	-				
	-				
	-				
	-				
NON-GAME FISH SUBTOTAL:		58	12	39.4	54
ALL SPECIES TOTAL:		481	100%	72.3	100%

* one hour electrofishing, one trap net night, and one combined floating and sinking gill net night.

LAKE/RESERVOIR NAME: BLACK LAKE REGION: PANHANDLE

DATE: 7-19-95 SAMPLE CREW LEADER:

Length range | Species LMB

(mm)	G.N.	T.N.	E.F.	Add'l	(mm)	G.N.	T.N.	E.F.	Add'l
					370-379	1			
80-89			2		380-389				
90-99			5		390-399				
100-109			15		400-409				
110-119			17		410-419				
120-129			26		420-429	1		1	
130-139	4		27		430-439				
140-149	7		19		440-449	1		1	
150-159	6		11		450-459				
160-169	1		3		460-469				
170-179	1		3		470-479				
180-189					480-489				
190-199					490-499				
200-209					500-509				
210-219					510-519	1			
220-229					520-529				
230-239			1		530-539				
240-249					540-549				
250-259					550-559				
260-269					560-569				
270-279			1		570-579				
280-289			1		580-589				
290-299					590-599				
300-309					600-609				
310-319					610-619				
320-329					620-629				
330-339					Batch:				
340-349					Size				
350-359					Number	23	0	134	
360-369					Tot.Wt.				

DATA SHEET (1 of 1)

LAKE/RESERVOIR NAME: BLACK LAKE REGION: PANHANDLE

DATE: 7-19-95 SAMPLE CREW LEADER:

Length range	Species NPike								
(mm)	G.N.	T.N.	E.F.	Add'l	(mm)	G.N.	T.N.	E.F.	Add'l
					370-379				
					380-389				
					390-399				
					400-409				
110-119					410-419				
120-129					420-429				
130-139					430-439				
140-149					440-449				
150-159					450-459				
160-169					460-469				
170-179					470-479				
180-189					480-489				
190-199					490-499				
200-209					500-509				
210-219					510-519				
220-229					520-529				
230-239					530-539	1			
240-249					540-549				
250-259					550-559				
260-269					560-569				
270-279					570-579				
280-289					580-589				
290-299					590-599				
300-309					600-609				
310-319					610-619				
320-329					620-629				
330-339					650 ~~Batch:~~	1			
340-349					690 ~~Size~~	1			
350-359					Number	3			
360-369					Tot.Wt.				

LAKE/RESERVOIR NAME: BLACK LAKE REGION: PANHANDLE

DATE: 7-19-95 SAMPLE CREW LEADER:

Length range	Species PERCH				Species BLACK CRAPPIE			
(mm)	G.N.	T.N.	E.F.	Add'l	G.N.	T.N.	E.F.	Add'l
90-99			1					
100-109			5		3			
110-119			21		36			
120-129	1	1	8		24			
130-139			8		1			
140-149	2		4		3			
150-159			10					
160-169	6		11					
170-179	3		17		1			
180-189	4		5					
190-199	11		8					
200-209	8		7					
210-219	11		1		2			
220-229	5				3			
230-239	4				1			
240-249	1							
250-259					1			
260-269					1			
270-279								
280-289								
290-299								
300-309								
310-319								
320-329								
330-339								
340-349								
Batch Samples:								
Size Range								
Numbers	56	1	106		76			
Total Weight								

DATA SHEET (4 of 7)

LAKE/RESERVOIR NAME: BLACK LAKE REGION: PANHANDLE

DATE: 7-19-95 SAMPLE CREW LEADER:

Length range	Species Pumpkinseed				Species Br. Bullhead			
(mm)	G.N.	T.N.	E.F.	Add'l	G.N.	T.N.	E.F.	Add'l
< 79			4					
80 - 89			2					
90 - 99			1					
100 - 109			2					
110-119	1		2					
120-129			3					
130-139	1		1					
140-149			1					
150-159	1							
160-169								
170-179								
180-189								
190-199						1		
200-209						1		
210-219					3			
220-229					1	2		
230-239					1	1		
240-249						2		
250-259								
260-269						2		
270-279								
280-289						1		
290-299								
300-309								
310-319								
320-329								
330-339								
340-349								
Batch Samples:								
Size Range								
Numbers	3		16		5	10		
Total Weight								

DATA SHEET (5 of 7)

LAKE/RESERVOIR NAME: BLACK LAKE REGION: PANHANDLE

DATE: 7-19-95 SAMPLE CREW LEADER:

Length range	Species Kokanee				Species			
(mm)	G.N.	T.N.	E.F.	Add'l	G.N.	T.N.	E.F.	Add'l
110-119								
120-129								
130-139								
140-149								
150-159								
160-169	1							
170-179	2							
180-189	1							
190-199	1							
200-209								
210-219								
220-229								
230-239								
240-249								
250-259	1							
260-269	1							
270-279								
280-289								
290-299								
300-309								
310-319								
320-329								
330-339								
340-349								
Batch Samples:								
Size Range								
Numbers	7							
Total Weight								

DATA SHEET (6 of 7)

LAKE/RESERVOIR NAME: BLACK LAKE REGION: PANHANDLE

DATE: 7-19-95 SAMPLE CREW LEADER:

Length range	Species TENCH								
(mm)	G.N.	T.N.	E.F.	Add'l	(mm)	G.N.	T.N.	E.F.	Add'l
					370-379	6			
					380-389	4			
					390-399	4			
					400-409	3			
110-119					410-419	6	2		
120-129					420-429		1		
130-139					430-439				
140-149					440-449				
150-159					450-459	1			
160-169					460-469				
170-179					470-479				
180-189					480-489				
190-199					490-499				
200-209					500-509				
210-219					510-519				
220-229					520-529				
230-239					530-539				
240-249					540-549				
250-259					550-559				
260-269					560-569				
270-279					570-579				
280-289					580-589				
290-299					590-599				
300-309					600-609				
310-319					610-619				
320-329					620-629				
330-339					Batch:				
340-349					Size				
350-359	3				Number	28	3	19	
360-369	1				Tot.Wt.				

DATA SHEET (1 of 1)

LAKE/RESERVOIR NAME: BLACK LAKE REGION: PANHANDLE

DATE: 7-19-95 SAMPLE CREW LEADER:

Length range | Species SQUAWFISH

(mm)	G.N.	T.N.	E.F.	Add'l	(mm)	G.N.	T.N.	E.F.	Add'l
					370-379				
					380-389				
					390-399				
					400-409				
110-119					410-419				
120-129					420-429	1			
130-139					430-439				
140-149					440-449				
150-159					450-459				
160-169					460-469				
170-179					470-479				
180-189					480-489				
190-199					490-499				
200-209					500-509				
210-219					510-519				
220-229					520-529				
230-239					530-539				
40-249					540-549				
50-259					550-559				
60-269					560-569				
70-279					570-579				
80-289					580-589				
90-299	1				590-599				
00-309					600-609				
10-319	2				610-619				
20-329	1		1		620-629				
30-339					Batch:				
0-349					Size				
0-359	1				Number	6		1	
0-369					Tot.Wt.				

LOWLAND LAKES AND RESERVOIRS FISH SURVEY - AGE AND GROWTH SUMMARY SHEET

LAKE/RESERVOIR NAME BLACK LAKE REGION PANHANDLE DATE COLLECTED 7-18-95 SPECIES LARGEMOUTH BASS

Age group	Number aged	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	XIV	XV	Len. at cap.
		Back calculated length (mm) at each annulus															
0																	
I	41	96															129
II	3	79	137														170
III	2	71	134	229													253
IV	1	86	138	201	244												280
V	1	85	190	275	355	399											425
VI	0																
VII	0																
VIII	1	67	154	210	257	321	363	389	408								425
IX	2	76	157	236	292	326	355	381	410	432							443
X	0																
XI	0																
XII	1	65	133	199	280	314	339	383	422	440	463	478	487				510
XIII																	
XIV																	
XV																	
Mean length		92	146	227	287	337	353	383	412	435	463	478	487				
Number aged		52	11	8	6	5	4	4	4	3	1	1	1				

Appendix K. Summary of lake survey data collected from Rose Lake, Idaho, 1995.

LOWLAND LAKES AND RESERVOIRS FISH SURVEY
COVER SHEET

LAKE/RESERVOIR NAME: ROSE LAKE **REGION:** PANHANDLE

DATE: 7-5-95 **SAMPLE CREW:** ____________________

SCALE ENVELOPE NUMBERS: ____________ **TO** ____________

SAMPLING CONDITIONS:

Water Temp. (°C @ .5 m): 22.5 Air Temp. Range (°C): ______ to ______

Secchi Range (m): 1.3 to 1.5

Wind (may circle more than one): 0-10 10-20 20+ mph

N NE E SE S SW W NW

SAMPLING EFFORT:

Combined floating and sinking gill net: 2.5 nights

Electrofishing: 0.8 hours; trap net: 2 nights

Other (including add'l size selective sampling): ____________________

____

SAMPLING LOCATIONS:
Draw or attach a lake/reservoir map and indicate fisheries and limnological sampling locations; footnoting with narrative if necessary.

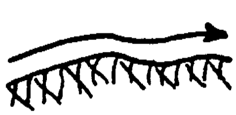
KEY:


Trap Net

S-X Secchi reading


Gill Net (F,S,FS)

TDO-X Surface/bottom and profile readings


Electrofishing

LOWLAND LAKES AND RESERVOIRS
STANDARD DATA BASE

WATER AREA CHARACTERISTICS

Lake/Reservoir Name: ROSE LAKE Region: PANHANDLE

Date: 7/5/95 Person Completing Form: ______

Hydrological Unit: ______ Catalogue No.: ______

Type of Water: X Natural ___ Man-made ___ Impounded Natural

Full Pool: Volume ______ (acre ft.) Area 350 (acres)

Elevation ______ (ft.) Maximum Depth ______ (ft.)

Minimum Pool: Volume ______ (acre ft.) Elevation ______ (ft.)

Mean Annual Inflow (or Outflow): ______ (acre ft.)

Trophic Status: __Oligotrophic X Mesotrophic __Eutrophic MEI($\sqrt{(TDS)/d}$): ______

Shoreline Length: ______ (km)

Approximate % Shoreline in:

Urban	Agriculture	Range	Forest	Wetland
30				70

Approximate % Shoreline Ownership:

Federal	State	Private
	90	10

Known Winter Kills?: X No ___ Yes ______ (years)

Littoral Zone Substrate:

Bedrock	Boulder/Rubble	Gravel	Sand	Silt/Mud/Detritus	
	5	10	5	80	= 100%

Littoral Zone Cover: Total 50 %

Large Organic Debris	Docks	Boulder/Rubble	Vegetation	
			100	= 100%

LOWLAND LAKES AND RESERVOIRS
STANDARD DATA BASE

LIMNOLOGICAL CHARACTERISTICS
(To be measured during July 20-Sept. 10 period.
Measurement locations to be indicated on file map.)

LAKE/RESERVOIR NAME: ROSE LAKE **REGION:** PANHANDLE

DATE: 8-22-95 **PERSON COMPLETING FORM:** ______

MINIMUM DATA SET:

HARDNESS (ppm) 80 ______

pH: 6.8 (surface) ______ (bottom) Total alkalinity (ppm): 80 (surface) ______ (bottom)

Conductivity (µmhos): 32 (surface)

Secchi (m): 1.4 (location 1), 1.5 (location 2), 1.3 (location 3), 1.4 (location 4) = 1.4 (mean)

Temperature and D.O. profile:
(measured at 1-m increments or 10 depth intervals)

Temperature (°C):	22.5	20.6	20.4	19.9	19.3	18.8	18.7			
D.O. (ppm):	7.7	7.9	8.2	8.3	7.9	2.5	2.1			
Depth (m):	0	1	2	3	4	5	5.5			

Volume of trout habitat (<21°C, >5 ppm D.O.): ______ m^3

Trout habitat as a percent of full pool volume: ______ %

OPTIONAL ADDITIONAL DATA:

Chlorophyll a (µ g/L): ______ Total phosphates (mg/L): ______

T.D.S. (mg/L): ______ Nitrate nitrogen (mg/L): ______

Zooplankton (no/L >____): ______

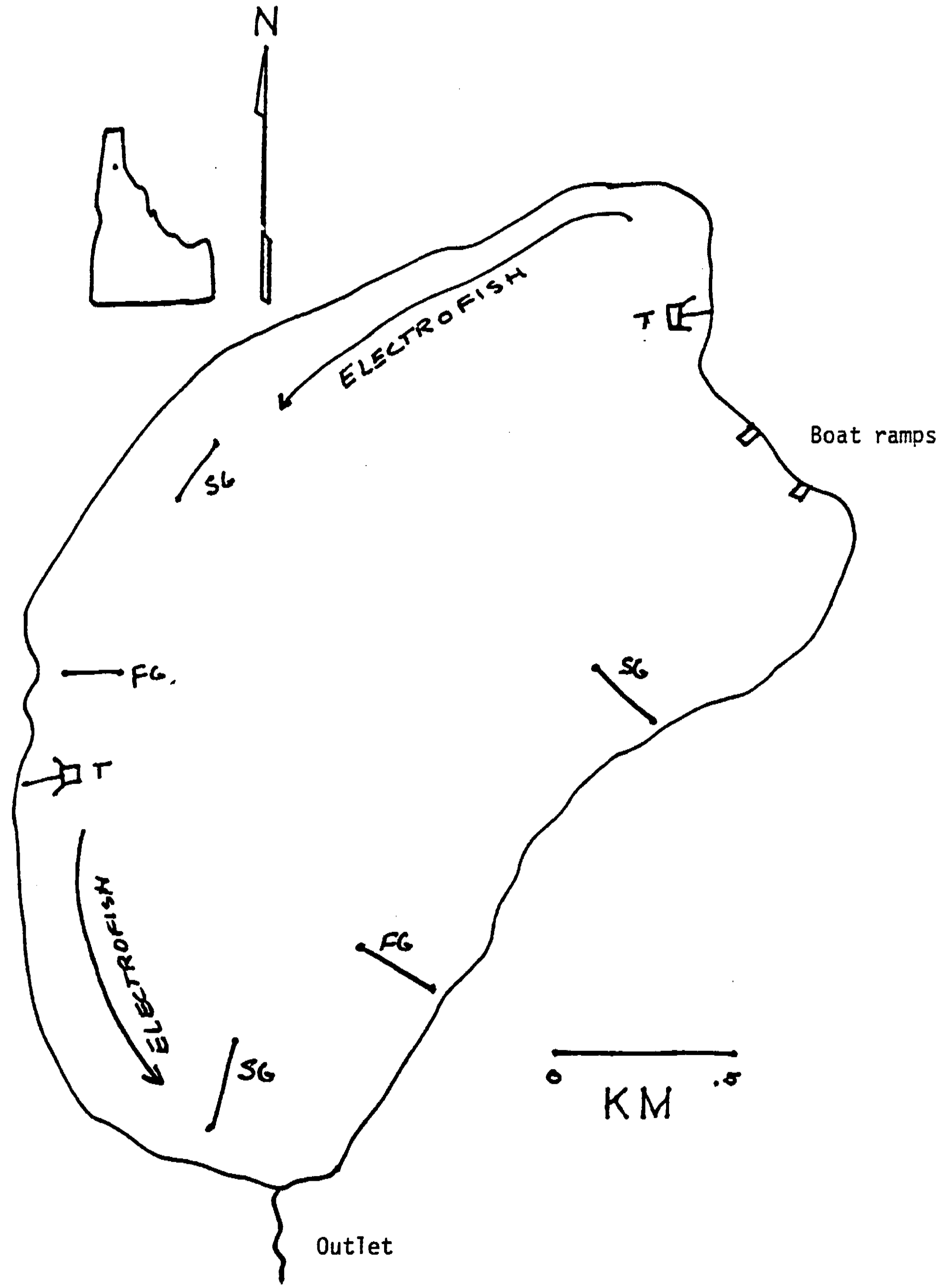


Figure R1. Location of fish and limnological sampling sites on Rose Lake, Idaho, 1995.

LOWLAND LAKES AND RESERVOIRS
STANDARD DATA BASE

FISH COMMUNITY CHARACTERISTICS

LAKE/RESERVOIR NAME: ROSE LAKE REGION: 1 DATE: 7/5/95

Catch Per Unit* of Combined Gear Sampling Effort

SPECIES	LENGTH - RANGE(mm)	No.	%	Wt.(kg)	%
LMB	80 - 380	121	28	17.3	23
BLUEGILL	110 - 180	11	3	.6	.7
B.CRAPPIE	90 - 300	39	9	3.9	5
PERCH	60 - 240	82	19	5.0	7
PUMPKINSEED	40 - 260	107	25	3.9	5
Br. Bullhead	160 - 370	16	4	2.3	3
	-				
	-				
	-				
	-				
	-				
GAME FISH SUBTOTAL:		376	88	33	43
TENCH	340 - 600	50	12	43	
	-				
	-				
	-				
	-				
	-				
	-				
	-				
	-				
	-				
	-				
	-				
NON-GAME FISH SUBTOTAL:		50	12	43	57
ALL SPECIES TOTAL:		426	100%	76	100%

* one hour electrofishing, one trap net night, and one combined floating and sinking gill net night.

LOWLAND LAKES AND RESERVOIRS FISH SURVEY
AGE AND GROWTH SUMMARY SHEET

LAKE/RESERVOIR NAME: Rose Lake REGION: Panhandle

DATE OF COLLECTION: 7-5-95

SPECIES Black Crappie

Age group	Number aged	Back calculated length (mm) at each annulus I	II	III	IV	V	VI	VII	VIII	Length at capture
0	0									
I	0									
II	4	54.2	122.6							155.0
III	14	57.1	114.4	182.3						201.4
IV	2	58.97	109.0	138.3	194.6					205.0
V	1	66.6	116.5	165.1	233.2	250.3				260.0
VI										
VIII	1	62.12	145.9	219.2	247	261.8	271.7	284	294	300
Average length		-	117	182.2	217.4	256	271.7	284	294	
Number aged			22	18	4	2	1	1	1	

SPECIES: Bluegill

Age group	Number aged	Back calculated length (mm) at each annulus I	II	III	IV	V	VI	VII	Length at capture
0									
I	2	45.1							62.5
II	1	36.3	84.4						115.0
III	9	42.4	88.9	134.0					151.1
IV	2	34.7	67.9	112.2	130.6				137.5
V									
VI									
VII									
Average length		41.3	84.5	130.03	130.6				
Number aged		14	12	11	2				

SPECIES:

Age group	Number aged	Back calculated length (mm) at each annulus I	II	III	IV	V	VI	VII	Length at capture
0									
I									
II									
III									
IV									
V									
VI									
VII									
Average length									
Number aged									

LOWLAND LAKES AND RESERVOIRS FISH SURVEY

DATA SHEET (1 of 5)

LAKE/RESERVOIR NAME: ROSE LAKE REGION: PANHANDLE

DATE: 7-5-95 SAMPLE CREW LEADER:

Length range	Species LMB								
(mm)	G.N.	T.N.	E.F.	Add'l	(mm)	G.N.	T.N.	E.F.	Add'l
					370-379				
80-89			1		380-389	1			
90-99			7		390-399				
100-109			3		400-409				
110-119			4		410-419				
120-129			5		420-429				
130-139			5		430-439				
140-149			4		440-449				
150-159			6		450-459				
160-169			1		460-469				
170-179	1				470-479				
180-189	1				480-489				
190-199			2		490-499				
200-209	1		3		500-509				
210-219			4		510-519				
220-229			3		520-529				
230-239			1		530-539				
240-249			1		540-549				
250-259	3		7		550-559				
260-269	2		9		560-569				
270-279	1		8		570-579				
280-289	1		12		580-589				
290-299			5		590-599				
300-309			3		600-609				
310-319			4		610-619				
320-329	1		1		620-629				
330-339			3		Batch:				
340-349			4		Size				
350-359			3		Number	12		109	
360-369					Tot.Wt.				

DATA SHEET (2 of 5)

LAKE/RESERVOIR NAME: ROSE LAKE REGION: PANHANDLE

DATE: 7-5-95 SAMPLE CREW LEADER:

Length range	Species Br Bullheads								
(mm)	G.N.	T.N.	E.F.	Add'l	(mm)	G.N.	T.N.	E.F.	Add'l
					370-379	1			
					380-389				
					390-399				
					400-409				
110-119					410-419				
120-129					420-429				
130-139					430-439				
140-149					440-449				
150-159					450-459				
160-169	2				460-469				
170-179					470-479				
180-189					480-489				
190-199					490-499				
200-209					500-509				
210-219					510-519				
220-229					520-529				
230-239	2		1		530-539				
240-249	5		1		540-549				
250-259			1		550-559				
260-269					560-569				
270-279			1		570-579				
280-289					580-589				
290-299	1				590-599				
300-309					600-609				
310-319					610-619				
320-329					620-629				
330-339	1				Batch:				
340-349					Size				
350-359					Number				
360-369					Tot.Wt.				

LAKE/RESERVOIR NAME: ROSE REGION: PANHANDLE
DATE: 7-5-95 SAMPLE CREW LEADER:

Length range	Species BLUEGILL				Species PERCH			
(mm)	G.N.	T.N.	E.F.	Add'l	G.N.	T.N.	E.F.	Add'l
< 79			2 [illegible]				2	
80-89					1		6	
90-99							9	
100-109							3	
110-119			1				3	
120-129			2				5	
130-139			1				3	
140-149			3		2		3	
150-159					7			
160-169	1				5		3	
170-179	1		2	✓	3		2	
180-189			1	✓	4			
190-199					4			
200-209					1			
210-219					5			
220-229					6			
230-239					2			
240-249					1			
250-259								
260-269								
270-279								
280-289								
290-299								
300-309								
310-319								
320-329								
330-339								
340-349								
Batch Samples:								
Size Range								
Numbers	2		12		41		39	
Total Weight								

DATA SHEET (4 of 5)

LAKE/RESERVOIR NAME: ROSE LAKE REGION: PANHANDLE

DATE: 7-5-95 SAMPLE CREW LEADER:

Length range	Species B. CRAPPIE				Species PUMPKINSEED			
(mm)	G.N.	T.N.	E.F.	Add'l	G.N.	T.N.	E.F.	Add'l
70-79						9	29	
80-89								
90-99	1						2	
100-109							5	
110-119							3	
120-129							5	
130-139					1	1	1	
140-149					1		20	
150-159	2				4		17	
160-169	2				2		2	
170-179					1		1	
180-189	2						2	
190-199	14							
200-209	6							
210-219	6		1					
220-229	2							
230-239								
240-249								
250-259								
260-269	1				1			
270-279								
280-289								
290-299								
300-309	2							
310-319								
320-329								
330-339								
340-349								
Batch Samples:								
Size Range								
Numbers	38		1		10	10	87	
Total Weight								

LOWLAND LAKES AND RESERVOIRS FISH SURVEY

DATA SHEET (5 of 5)

LAKE/RESERVOIR NAME: ROSE LAKE REGION: PANHANDLE

DATE: 2-5-95 SAMPLE CREW LEADER:

Length range	Species TENCH								
(mm)	G.N.	T.N.	E.F.	Add'l	(mm)	G.N.	T.N.	E.F.	Add'l
					370-379	1			
					380-389	5			
					390-399	10			
					400-409	5			
110-119					410-419	5			
120-129					420-429	5			
130-139					430-439	2			
140-149					440-449				
150-159					450-459	1			
160-169					460-469				
170-179					470-479				
180-189					480-489				
190-199					490-499				
200-209					500-509	2			
210-219					510-519				
220-229					520-529				
230-239					530-539				
240-249					540-549				
250-259					550-559				
260-269					560-569				
270-279					570-579				
280-289					580-589				
290-299					590-599				
300-309					600-609				
310-319					610-619				
320-329					620-629				
330-339					Batch:				
340-349	2				Size				
350-359					Number	38			
360-369					Tot.Wt.				

LOWLAND LAKES AND RESERVOIRS FISH SURVEY - AGE AND GROWTH SUMMARY SHEET

LAKE/RESERVOIR NAME ROSE LAKE REGION PANHANDLE DATE COLLECTED 7-5-95 SPECIES Largemouth bass

Age group	Number aged	Back calculated length (mm) at each annulus															Len. at cap.
		I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	XIV	XV	
0	8																
I	27	92															116
II	9	71	140														164
III	20	80	169	221													239
IV	15	69	147	214	255												271
V	9	72	142	195	245	282											298
VI	10	80	152	200	247	291	315										327
VII	3	82	153	216	244	279	310	331									343
VIII	2	80	130	190	237	264	301	320	336								348
IX	0																0
X	1	70	131	176	222	256	309	339	370	391	414						426
XI																	
XII																	
XIII																	
XIV																	
XV																	
Mean length		80	152	210	248	283	312	329	347	391	414						
Number aged		96	69	60	40	25	16	6	3	1	1						

LOWLAND LAKES AND RESERVOIRS FISH SURVEY
AGE AND GROWTH SUMMARY SHEET

LAKE/RESERVOIR NAME: Rose Lake REGION: Panhandle

DATE OF COLLECTION: 7-18-96

SPECIES Black Crappie

Age group	Number aged	Back calculated length (mm) at each annulus								Length at capture
		I	II	III	IV	V	VI	VII	VIII	
0	0									
I	13	88								120
II	2									
III	1	106	158	191						216
IV	3	75	114	153	183					203
V	3	67	111	151	183	205				225
VI	1	66	137	174	205	236	244			260
VIII	1	71	110	137	168	183	205	224	240	255
Average length		82	120	157	184	205	224	224	240	
Number aged		22	9	9	8	5	2	1	1	

SPECIES:

Age group	Number aged	Back calculated length (mm) at each annulus							Length at capture
		I	II	III	IV	V	VI	VII	
0									
I									
II									
III									
IV									
V									
VI									
VII									
Average length									
Number aged									

SPECIES:

Age group	Number aged	Back calculated length (mm) at each annulus							Length at capture
		I	II	III	IV	V	VI	VII	
0									
I									
II									
III									
IV									
V									
VI									
VII									
Average length									
Number aged									

Appendix L. Summary of lake survey data collected from Kelso Lake, Idaho, 1995.

LOWLAND LAKES AND RESERVOIRS FISH SURVEY
COVER SHEET

LAKE/RESERVOIR NAME: Kelso Lake REGION: 1

DATE: 6/23/95 Gillnet, 8/9/95 E Fish, 9/6/95 Limnology SAMPLE CREW: Nelson

SCALE ENVELOPE NUMBERS: ______ TO ______

SAMPLING CONDITIONS:

Water Temp. (°C @ .5 m): 18° Air Temp. Range (°C): 12° to 18°

Secchi Range (m): 4 to ______

Wind (may circle more than one): 0-10 10-20 20+ mph

N NE E SE S SW W NW

SAMPLING EFFORT:

Combined floating and sinking gill net: 3 nights

Electrofishing: 0.69 hours; trap net: — nights

Other (including add'l size selective sampling): ______

SAMPLING LOCATIONS:

Draw or attach a lake/reservoir map and indicate fisheries and limnological sampling locations; footnoting with narrative if necessary.

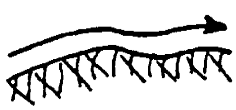
KEY:


Trap Net

S-X Secchi reading


Gill Net (F,S,FS)

TDO-X Surface/bottom and profile readings


Electrofishing

LOWLAND LAKES AND RESERVOIRS
STANDARD DATA BASE

LIMNOLOGICAL CHARACTERISTICS
(To be measured during July 20-Sept. 10 period.
Measurement locations to be indicated on file map.)

LAKE/RESERVOIR NAME: Kelso Lake **REGION:** Panhandle

DATE: 9-6-95 **PERSON COMPLETING FORM:** M. Gilliland

MINIMUM DATA SET:

pH: 7.78 (surface) ____ (bottom) Total alkalinity (ppm): 60 mg/l (surface) ____ (bottom)

Conductivity (µmhos): 6.4 (x10) (surface) hardness: 60 mg/l

Secchi (m): 4 (location 1), ____ (location 2), ____ (location 3), ____ (location 4) = ____ (mean)

Temperature and D.O. profile:
(measured at 1-m increments or 10 depth intervals)

Temperature (°C):	19.1	19.1	18.9	18.8	18.5	15.5	13.0	9.0	7.7	6.7	5
D.O. (ppm):	8.2	8.1	7.5	7.2	7.0	1.4	.9	.9	.7	.7	.7
Depth (m):	—	1	2	3	4	5	6	7	8	9	1

Volume of trout habitat (<21°C, >5 ppm D.O.): ____ m^3

Trout habitat as a percent of full pool volume: ____ %

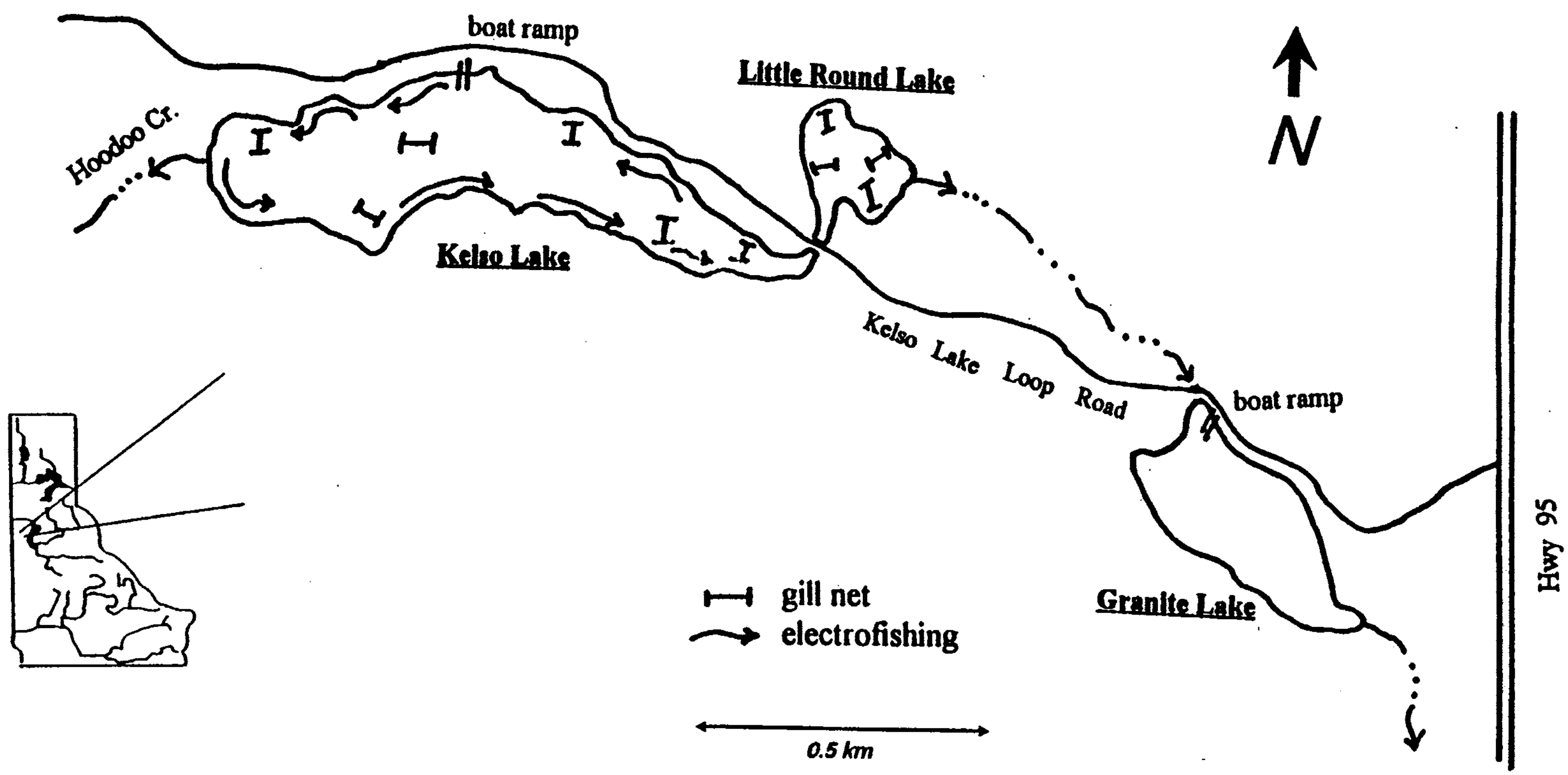
OPTIONAL ADDITIONAL DATA:

Chlorophyll a (µ g/L): ____ Total phosphates (mg/L): ____

T.D.S. (mg/L): .4 Nitrate nitrogen (mg/L): ____

Zooplankton (no/L >____): ____

Map of Kelso, Little Round and Granite lakes, Bonner County, Idaho, showing 1995 gill net and electrofishing sampling locations.



LOWLAND LAKES AND RESERVOIRS
STANDARD DATA BASE

FISH COMMUNITY CHARACTERISTICS

LAKE/RESERVOIR NAME: Kelso LK REGION: 1 DATE: 8/9/95 6/23/95

Catch Per Unit* of Combined Gear Sampling Effort 3.69/3 = 1.2

SPECIES	LENGTH - RANGE(mm)	No.	%	Wt.(kg)	%
LMB	60 - 529	61	44.5	14.409	66.2
BG	50 - 169	25	18.2	0.732	3.4
PS	40 - 159	34	24.8	1.369	6.3
PE	170 - 199	6	4.4	0.465	2.1
	-				
	-				
	-				
	-				
	-				
	-				
	-				
GAME FISH SUBTOTAL:			91.9		78
BBH	230 - 249	2	1.5	0.390	1.8
TT	300 - 359	9	6.6	4.390	20.2
	-				
	-				
	-				
	-				
	-				
	-				
	-				
	-				
	-				
	-				
NON-GAME FISH SUBTOTAL:			8.1		22.0
ALL SPECIES TOTAL:			100%		100%

* one hour electrofishing, one trap net night, and one combined floating and sinking gill net night.

AGE AT LENGTH BACKCALCULATION DATA FORM

LAKE Kelso SPECIES LMB DATE COLLECTED 8/95

technician: ______ date: 12/95 bony part: scale

Eberbach (40X)____ Microfiche (42X) X Disecting scope (power ?)____

env.#	len.	TOTAL AGE	age-1	age-2	age-3	age-4	age-5	age-6	age-7	age-8	age-9	edge
			scale measurement									
1	97	1+	26									52
2	106	1+	34									59
3	108	1+	32									61
4	120	1+	32									65
5	121	1+	31									65
6	122	1+	32									66
7	124	1+	33									65
8	132	1+	42									69
9	142	1+	51									83
10	193	2+	32	85								96
11	204	4+	23	52	74	117						130
12	206	3+	36	74	106							118
13	200	3+	27	62	108							124
14	208	3+	30	73	114							127
15	219	3+	31	66	113							125
16	222	3+	39	85	127							142
17	226	4+	33	56	88	110						123
18	237	5+	24	51	80	110	132					151
19	241	4+	24	68	88	121						142
20	241	4+	27	57	89	130						152
21	273	4+	31	58	97	145						160
22	375	6+	35	81	120	155	193	232				259
23	364	6+	27	70	121	153	173	193				216
24	399	7+	29	69	116	132	152	167	222			239
25	522	8+	40	115	150	196	227	257	267	277		289
26	562	14+	60	83	105	136	174	184	210	227	246	

age 10-280 age 11-301 age 12-320 age 13-337 age 14-354

Edge-37.

AGE AT LENGTH BACKCALCULATION DATA FORM

LAKE Kelso SPECIES BG/PS DATE COLLECTED 8-9-95

technician: ____ date: 11/95 bony part: scale

Eberbach (40X)____ Microfiche (42X) X Disecting scope (power ?)____

	env.#	len.	TOTAL AGE	scale measurement age-1	age-2	age-3	age-4	age-5	age-6	age-7	age-8	age-9	edg
bluegill	1	76	1+	26									65
	2	77	1+	25									64
	3	81	1+	27									69
	4	110	2+	85	55								105
	5	126	2+	40	74								116
	6	129	2+	37	76								119
	7	136	2+	42	82								124
	8	154	3+	21	61	119							145
	9	155	3+	20	57	110							150
	10	161	3+	20	62	121							151
	11	168	3+	19	64	119							158
pumpkinseed													
	1	111	3+	17	41	71							114
	2	104	3+	14	37	80							115
	3	130	3+	22	51	100							139
	4	132	3+	21	53	93							130
	5	144	3+	29	76	120							145
	6	159	4+	17	51	90	136						158

LOWLAND LAKES AND RESERVOIRS FISH SURVEY
SPECIES SUMMARY SHEET

ATCH COMPOSITION OF:(species) Largemouth Bass LAKE/RESERVOIR: Kelso Lake

ATE: 6/23 & 8/9/95 PERIOD:

Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ I/M	Maturity ♀ I/M	Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ I/M	Maturity ♀ I/M
								340-349	0.8	1.6	510				
50-59								350-359							
60-69	0.8	1.6	3					360-369	0.8	1.6	750				
70-79								370-379	0.8	1.6	950				
80-89	0.8	1.6	7					380-389							
90-99	1.6	3.3	11					390-399	0.8	1.6	1100				
100-109	3.3	6.6	14					400-409							
110-119	2.4	4.9	16					410-419							
120-129	8.1	16.4	21					420-429							
130-139	2.4	4.9	25					430-439							
140-149	2.4	4.9	31					440-449							
150-159								450-459							
50-169								460-469							
70-179								470-479	PSD =		$\frac{8}{33}$	×100 = 24			
80-189								480-489							
90-199	0.8	1.6	70					490-499							
00-209	4.1	8.2	87					500-509							
10-219	5.7	11.5	108					510-519							
20-229	4.9	9.8	118					520-529	0.8	1.6	3250				
30-239	0.8	1.6	140					530-539							
40-249	3.3	4.9	155					540-549							
50-259	0.8	1.6	200					550-559							
60-269								560-569	0.8	1.6	4000				
70-279	0.8	1.6	220					570-579							
80-289								580-589							
90-299								590-599							
00-309								600-609							
10-319								610-619							
20-329	0.8	1.6	400					620-629							
30-339	0.8	1.6	500					TOTAL	49.6	-					

TAL CATCH PER EFFORT OF: GILL NET 2 ELECTROFISHING 59 TRAP NET –

LOWLAND LAKES AND RESERVOIRS FISH SURVEY
SPECIES SUMMARY SHEET

ATCH COMPOSITION OF:(species) Bluegill LAKE/RESERVOIR: Kelso

ATE: 8/9/95 PERIOD:

Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ I/M	♀ I/M	Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ I/M	♀ I/M
								340-349							
50-59	2.4	12	5					350-359							
60-69	3.3	16	7					360-369							
70-79	2.4	12	8					370-379							
80-89	1.6	8	9					380-389							
90-99								390-399							
100-109								400-409							
110-119	0.8	4	26					410-419							
120-129	4.9	24	39					420-429							
130-139	1.6	8	46					430-439							
140-149								440-449							
50-159	1.6	8	71					450-459							
60-169	1.6	8	96					460-469							
70-179								470-479							
80-189								480-489							
90-199								490-499							
00-209								500-509							
10-219								510-519							
20-229								520-529							
30-239								530-539							
40-249								540-549							
50-259								550-559							
60-269								560-569							
70-279								570-579							
80-289								580-589							
90-299								590-599							
00-309								600-609							
10-319								610-619							
20-329								620-629							
30-339								TOTAL	20.3	-	732				

$PSD = \frac{4}{15} \times 100 = 26$

AL CATCH PER EFFORT OF: GILL NET 0. ELECTROFISHING 25 TRAP NET —

LOWLAND LAKES AND RESERVOIRS FISH SURVEY
SPECIES SUMMARY SHEET

CATCH COMPOSITION OF:(species) Pumpkinseed LAKE/RESERVOIR: Kelso Lk

DATE: 8/9/95 PERIOD:

Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ I/M	Maturity ♀ I/M
40-49	0.8	2.9	2				
50-59	1.6	5.9	3				
60-69	0.8	2.9	5				
70-79							
80-89							
90-99	0.8	2.9	19				
100-109	2.4	8.8	22				
110-119	4.9	17.6	27				
120-129	4.9	17.6	35				
130-139	4.1	14.7	47				
140-149	4.1	14.7	68				
150-159	3.3	11.8	81				
160-169							
170-179							
180-189							
190-199							
200-209							
210-219							
220-229							
230-239							
240-249							
250-259							
260-269							
270-279							
280-289							
290-299							
300-309							
310-319							
320-329							
330-339							

Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ I/M	Maturity ♀ I/M
340-349							
350-359							
360-369							
370-379							
380-389							
390-399							
400-409							
410-419							
420-429							
430-439							
440-449							
450-459							
460-469							
470-479							
480-489							
490-499							
500-509							
510-519							
520-529							
530-539							
540-549							
550-559							
560-569							
570-579							
580-589							
590-599							
600-609							
610-619							
620-629							
TOTAL	27.6	-	1369				

TOTAL CATCH PER EFFORT OF: GILL NET 0 ELECTROFISHING 34 TRAP NET -

LOWLAND LAKES AND RESERVOIRS FISH SURVEY
SPECIES SUMMARY SHEET

CATCH COMPOSITION OF: (species) Yellow Perch LAKE/RESERVOIR: Kelso Lk

DATE: 8/9/95 PERIOD:

Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ I/M	♀ I/M	Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ I/M	♀ I/M
								340-349							
50-59								350-359							
60-69								360-369							
70-79								370-379							
80-89								380-389							
90-99								390-399							
100-109								400-409							
110-119								410-419							
120-129								420-429							
130-139								430-439							
140-149								440-449							
150-159								450-459							
160-169								460-469							
170-179	0.8	16.7	62					470-479							
180-189	2.4	50	71					480-489							
190-199	1.6	33.3	95					490-499							
200-209								500-509							
210-219								510-519							
220-229								520-529							
230-239								530-539							
240-249								540-549							
250-259								550-559							
260-269								560-569							
270-279								570-579							
280-289								580-589							
290-299								590-599							
300-309								600-609							
310-319								610-619							
320-329								620-629							
330-339								TOTAL	4.9	-	465				

TOTAL CATCH PER EFFORT OF: GILL NET 4 ELECTROFISHING 2 TRAP NET

LOWLAND LAKES AND RESERVOIRS FISH SURVEY
SPECIES SUMMARY SHEET

ATCH COMPOSITION OF:(species) BBH LAKE/RESERVOIR: Kelso

ATE: 8/9/95 PERIOD:

Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ I/M	Maturity ♀ I/M	Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ I/M	Maturity ♀ I/M
								340-349	0.8	50	190				
50-59								350-359							
60-69								360-369							
70-79								370-379							
80-89								380-389							
90-99								390-399							
100-109								400-409							
110-119								410-419							
120-129								420-429							
130-139								430-439							
140-149								440-449							
150-159								450-459							
160-169								460-469							
70-179								470-479							
80-189								480-489							
90-199								490-499							
00-209								500-509							
10-219								510-519							
20-229								520-529							
30-239								530-539							
40-249								540-549							
50-259								550-559							
60-269								560-569							
70-279								570-579							
80-289								580-589							
90-299								590-599							
00-309								600-609							
10-319								610-619							
20-329								620-629							
30-339	0.8	50	200					TOTAL							

TAL CATCH PER EFFORT OF: GILL NET ______ ELECTROFISHING 2 TRAP NET ______

Appendix M. Summary of lake survey data collected from Little Round Lake, Idaho, 1995.

LOWLAND LAKES AND RESERVOIRS FISH SURVEY
COVER SHEET

LAKE/RESERVOIR NAME: Little Round REGION: 1

DATE: 8/9/95 SAMPLE CREW: ____________

SCALE ENVELOPE NUMBERS: ____________ TO ____________

SAMPLING CONDITIONS:

Water Temp. (°C @ .5 m): 17° Air Temp. Range (°C): 15 to 17

Secchi Range (m): 5 to ______

Wind (may circle more than one): 0-10 10-20 20+ mph

N NE E SE S SW W NW

SAMPLING EFFORT:

Combined floating and sinking gill net: 2 nights

Electrofishing: 0 hours; trap net: 0 nights

Other (including add'l size selective sampling): Hook & line = 1 week

SAMPLING LOCATIONS:
Draw or attach a lake/reservoir map and indicate fisheries and limnological sampling locations; footnoting with narrative if necessary.

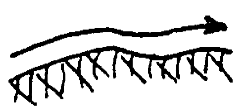
KEY:

 Trap Net

S-X Secchi reading

 Gill Net (F,S,FS)

TDO-X Surface/bottom and profile readings

 Electrofishing

LOWLAND LAKES AND RESERVOIRS
STANDARD DATA BASE

LIMNOLOGICAL CHARACTERISTICS
(To be measured during July 20-Sept. 10 period.
Measurement locations to be indicated on file map.)

LAKE/RESERVOIR NAME: Little Round REGION: Panhandle

DATE: 9, 8, 95 PERSON COMPLETING FORM: M. Gilliland

MINIMUM DATA SET:

pH: 7.52 (surface) ____ (bottom) Total alkalinity (ppm): 60 mg/l (surface) ____ (bottom)

Conductivity (μmhos): 6.5 (x10) (surface) hardness: 40 mg/l

Secchi (m): 5 (location 1), ____ (location 2), ____ (location 3), ____ (location 4) = ____ (mean)

Temperature and D.O. profile:
(measured at 1-m increments or 10 depth intervals)

Temperature (°C):	18.3	18.0	17.9	17.9	16.0	11.9	9.0	6.7	5.9	5.4
D.O. (ppm):	7.4	7.5	7.3	6.8	5.3	2.6	.6	.4	.4	.4
Depth (m):	—	1	2	3	4	5	6	7	8	9

Volume of trout habitat (<21°C, >5 ppm D.O.): ____ m^3

Trout habitat as a percent of full pool volume: ____ %

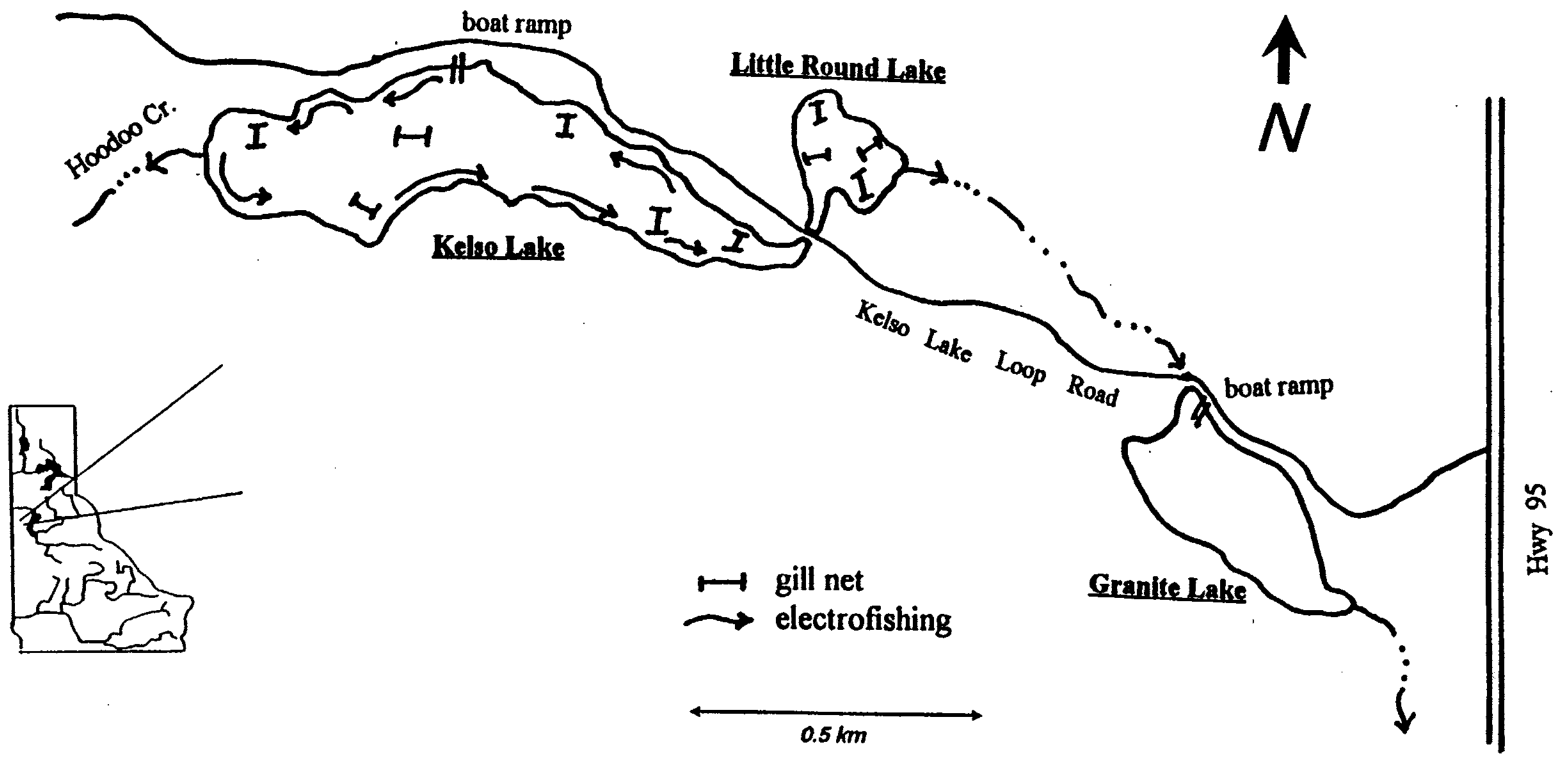
OPTIONAL ADDITIONAL DATA:

Chlorophyll a (μ g/L): ____ Total phosphates (mg/L): ____

T.D.S. (mg/L): .5 Nitrate nitrogen (mg/L): ____

Zooplankton (no/L >____): ____

Map of Kelso, Little Round and Granite lakes, Bonner County, Idaho, showing 1995 gill net and electrofishing sampling locations.



LOWLAND LAKES AND RESERVOIRS FISH SURVEY
SPECIES SUMMARY SHEET

ATCH COMPOSITION OF:(species) Bluegill LAKE/RESERVOIR: Little Round

ATE: 6/26 & 8/9/95 PERIOD:

Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ I/M	Maturity ♀ I/M	Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ I/M	Maturity ♀ I/M
								340-349							
50-59								350-359							
60-69								360-369							
70-79								370-379							
80-89								380-389							
90-99								390-399							
00-109								400-409							
10-119	1	3.2	29	1				410-419							
20-129	3	9.7	38	1				420-429							
30-139	8	25.8	49	1				430-439							
40-149	1	3.2	62	1				440-449							
50-159	4	12.9	77	1				450-459							
60-169	3	9.7	97					460-469							
70-179	3	9.7	116	1				470-479							
80-189	4	12.9	137	1				480-489							
90-199	2	6.5	166	1				490-499							
0-209								500-509							
0-219	3	9.7	220					510-519							
0-229								520-529							
0-239								530-539							
0-249								540-549							
0-259								550-559							
0-269								560-569							
0-279								570-579							
0-289								580-589							
0-299								590-599							
0-309								600-609							
-319								610-619							
-329								620-629							
-339								TOTAL	32	100					

PSD = $\frac{19}{32} \times 100 = 59$

AL CATCH PER EFFORT OF: GILL NET 0 ELECTROFISHING — TRAP NET —

Hook & line 32

LOWLAND LAKES AND RESERVOIRS
STANDARD DATA BASE

FISH COMMUNITY CHARACTERISTICS

6/26/95 ¢

LAKE/RESERVOIR NAME: Little Round REGION: 1 DATE: 8/9/95

Catch Per Unit* of Combined Gear Sampling Effort 3/3 = 1

SPECIES	LENGTH - RANGE(mm)	No.	%	Wt.(kg)	%
BK	320 - 340	2	5	0.810	18.2
LMB	160 - 229	6	15	0.566	12.7
BG	110 - 219	32	80	3.084	69.1
	-				
	-				
	-				
	-				
	-				
	-				
	-				
	-				
GAME FISH SUBTOTAL:		40	100	4.460	100
	-				
	-				
	-				
	-				
	-				
	-				
	-				
	-				
	-				
	-				
	-				
	-				
NON-GAME FISH SUBTOTAL:		0	0		0
ALL SPECIES TOTAL:		40	100%	4.460	100%

*one hour electrofishing, one trap net night, and one combined floating and sinking gill net night.

AGE AT LENGTH BACKCALCULATION DATA FORM

LAKE Little Round SPECIES BG/LMB DATE COLLECTED 9/95

technician: ____ date: 12/95 bony part: scale

Eberbach (40X)____ Microfiche (42X) Y Disecting scope (power ?)____

	env.#	len.	TOTAL AGE	scale measurement age-1	age-2	age-3	age-4	age-5	age-6	age-7	age-8	age-9	edge
BG	1	166	4+	15	64	115	148						175
	2	218	8+	18	48	70	98	136	162	192	229		246
LMB	1	170	2+	33	78								105
	2	190	3+	35	72	100							120
	3	211	3+	36	80	107							124
	4	212	3+	40	83	104							118
	5	224	3+	35	68	104							117

Appendix N. Summary of lake survey data collected from Freeman Lake, Idaho, 1995.

LOWLAND LAKES AND RESERVOIRS FISH SURVEY
COVER SHEET

LAKE/RESERVOIR NAME: Freeman Lake REGION: 1

DATE: 7/7/95 Fisheries SAMPLE CREW: ______
9/6/95 Limnology

SCALE ENVELOPE NUMBERS: ______ TO ______

SAMPLING CONDITIONS:

Water Temp. (°C @ .5 m): 17° Air Temp. Range (°C): 12° to 22°

Secchi Range (m): 3 m to ______

Wind (may circle more than one): 0-10 10-20 20+ mph

N NE E SE S SW W NW

SAMPLING EFFORT:

Combined floating and sinking gill net: 2 nights

Electrofishing: 0 hours; trap net: 2 nights

Other (including add'l size selective sampling): ______

SAMPLING LOCATIONS:
Draw or attach a lake/reservoir map and indicate fisheries and limnological sampling locations; footnoting with narrative if necessary.

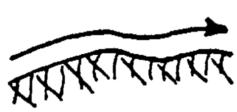
KEY:


Trap Net

S-X Secchi reading


Gill Net (F,S,FS)

TDO-X Surface/bottom and profile readings


Electrofishing

LOWLAND LAKES AND RESERVOIRS
STANDARD DATA BASE

LIMNOLOGICAL CHARACTERISTICS
(To be measured during July 20-Sept. 10 period.
Measurement locations to be indicated on file map.)

LAKE/RESERVOIR NAME: Freeman REGION: Panhandle

DATE: 9, 6, 95 PERSON COMPLETING FORM: M. Gilliland

MINIMUM DATA SET:

pH: 7.8 (surface) ____ (bottom) Total alkalinity (ppm): 120 (surface) ____ (bottom)

Conductivity (μmhos): 5.2 (x10) (surface) hardness: 20 mg/l

Secchi (m): 3 (location 1), ____ (location 2), ____ (location 3), ____ (location 4) = ____ (mean)

Temperature and D.O. profile:
(measured at 1-m increments or 10 depth intervals)

Temperature (°C):	18.7	18.4	18.1	17.0	15.9	14.5				
D.O. (ppm):	8.4	8.4	8.5	1.7	1.5	1.5				
Depth (m):	—	1	2	3	4	5				

Volume of trout habitat (<21°C, >5 ppm D.O.): ____ m^3

Trout habitat as a percent of full pool volume: ____ %

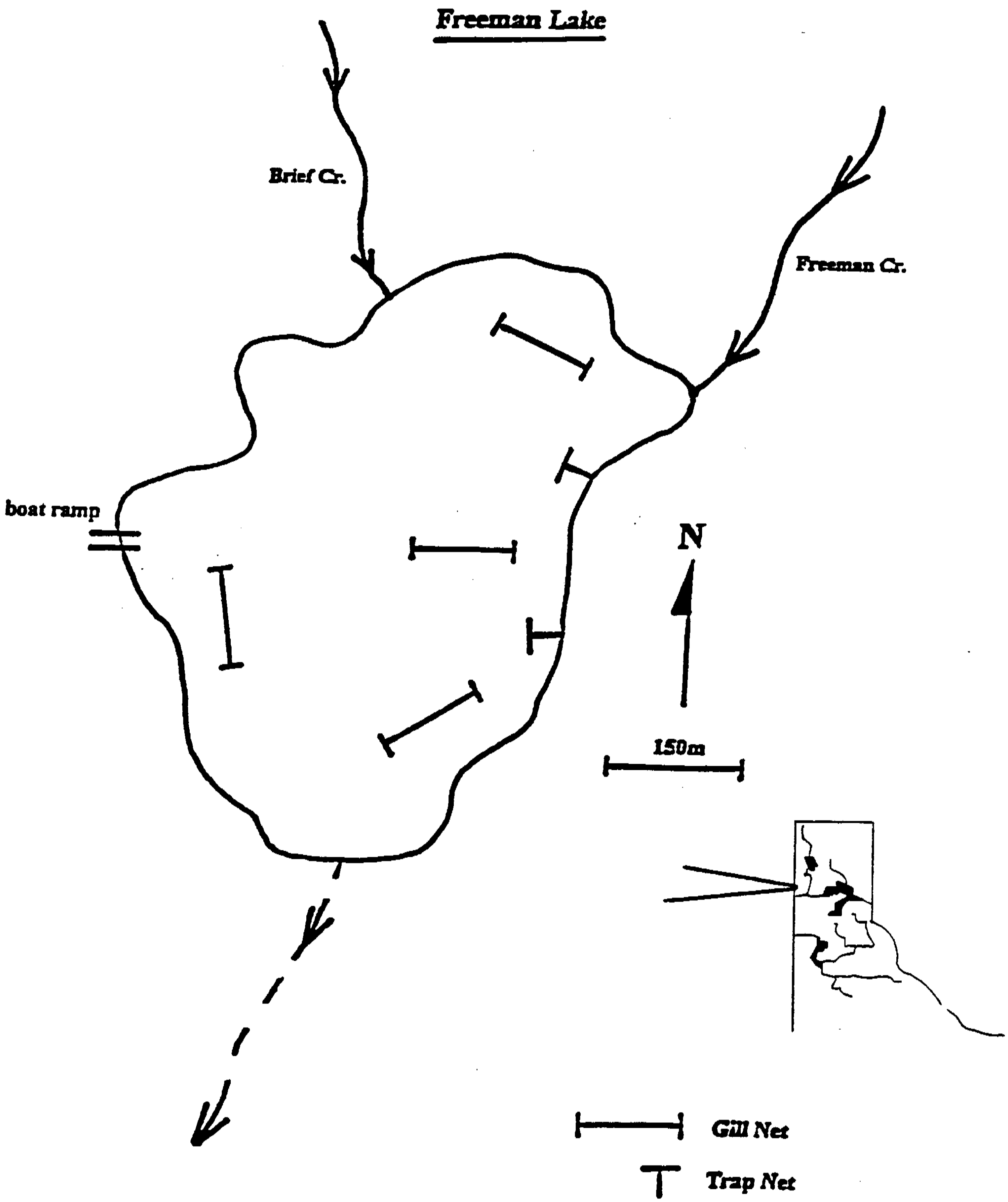
OPTIONAL ADDITIONAL DATA:

Chlorophyll a (μ g/L): ____ Total phosphates (mg/L): ____

T.D.S. (mg/L): .3 Nitrate nitrogen (mg/L): ____

Zooplankton (no/L >____): ____

Map of Freeman Lake, Bonner County, Idaho, showing 1995 gill net and trap net sampling locations.



LOWLAND LAKES AND RESERVOIRS
STANDARD DATA BASE

FISH COMMUNITY CHARACTERISTICS

LAKE/RESERVOIR NAME: Freeman Lk REGION: 1 DATE: 7/7/95

Catch Per Unit* of Combined Gear Sampling Effort 4/3 = 1.333

SPECIES	LENGTH - RANGE (mm)	No.	%	Wt. (kg)	%
PE	210 - 269	2	3.2	0.230	3.1
BC	280 - 309	2	3.2	0.350	4.7
PS	60 - 200	2	3.2	0.085	1.1
LMB	250 - 299	5	8.1	0.790	10.6
RBT	200 - 339	51	82.3	6.705	89.9
TM	- 510	1	1.6	0.750	10.1
	-				
	-				
	-				
	-				
	-				
GAME FISH SUBTOTAL:		62	100%	7.456	100%
	-				
	-				
	-				
	-				
	-				
	-				
	-				
	-				
	-				
	-				
	-				
	-				
NON-GAME FISH SUBTOTAL:		0	0	0	0
ALL SPECIES TOTAL:		62	100%	7.456	100%

*one hour electrofishing, one trap net night, and one combined floating and sinking gill net night.

LOWLAND LAKES AND RESERVOIRS FISH SURVEY
SPECIES SUMMARY SHEET

CATCH COMPOSITION OF: (species) Yellow Perch LAKE/RESERVOIR: Freeman Lake

DATE: 7/7/95 PERIOD:

Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ I/M	Maturity ♀ I/M	Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ I/M	Maturity ♀ I/M
								340-349							
50-59								350-359							
60-69								360-369							
70-79								370-379							
80-89								380-389							
90-99								390-399							
100-109								400-409							
110-119								410-419							
120-129								420-429							
130-139								430-439							
140-149								440-449							
150-159								450-459							
160-169								460-469							
170-179								470-479							
180-189								480-489							
190-199								490-499							
200-209								500-509							
210-219	0.75	50	60					510-519							
220-229								520-529							
230-239								530-539							
240-249								540-549							
250-259								550-559							
260-269	0.75	50	170					560-569							
270-279								570-579							
280-289								580-589							
290-299								590-599							
300-309								600-609							
310-319								610-619							
320-329								620-629							
330-339								TOTAL							

TOTAL CATCH PER EFFORT OF: GILL NET 2 ELECTROFISHING 0 TRAP NET 0

LOWLAND LAKES AND RESERVOIRS FISH SURVEY
SPECIES SUMMARY SHEET

ATCH COMPOSITION OF:(species) Black Crappie LAKE/RESERVOIR: Freeman Lake

ATE: 7/7/95 PERIOD:

Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ I/M	Maturity ♀ I/M	Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ I/M	Maturity ♀ I/M
								340-349							
50-59								350-359							
60-69								360-369							
70-79								370-379							
80-89								380-389							
90-99								390-399							
100-109								400-409							
110-119								410-419							
120-129								420-429							
130-139								430-439							
140-149								440-449							
150-159								450-459							
160-169								460-469							
170-179								470-479							
180-189								480-489							
190-199								490-499							
200-209								500-509							
210-219								510-519							
220-229								520-529							
230-239								530-539							
240-249								540-549							
250-259								550-559							
260-269								560-569							
270-279								570-579							
280-289	0.75	50	80		3+			580-589							
290-299								590-599							
300-309	0.75	50	80		3+			600-609							
310-319								610-619							
320-329								620-629							
330-339								TOTAL							

TAL CATCH PER EFFORT OF: GILL NET 2 ELECTROFISHING — TRAP NET 0

LOWLAND LAKES AND RESERVOIRS FISH SURVEY
SPECIES SUMMARY SHEET

CATCH COMPOSITION OF:(species) Pumpkinseed LAKE/RESERVOIR: Freeman

DATE: 7/7/95 PERIOD:

Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ I/M	Maturity ♀ I/M	Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ I/M	Maturity ♀ I/M
								340-349							
50-59								350-359							
60-69	0.75	50	5		1+			360-369							
70-79								370-379							
80-89								380-389							
90-99								390-399							
100-109								400-409							
110-119								410-419							
120-129								420-429							
130-139								430-439							
40-149								440-449							
50-159								450-459							
60-169								460-469							
70-179								470-479							
80-189								480-489							
90-199								490-499							
00-209	0.75	50	80		4+			500-509							
10-219								510-519							
20-229								520-529							
30-239								530-539							
40-249								540-549							
50-259								550-559							
60-269								560-569							
70-279								570-579							
80-289								580-589							
0-299								590-599							
0-309								600-609							
0-319								610-619							
0-329								620-629							
0-339								TOTAL							

TOTAL CATCH PER EFFORT OF: GILL NET 2 ELECTROFISHING — TRAP NET 0

LOWLAND LAKES AND RESERVOIRS FISH SURVEY
SPECIES SUMMARY SHEET

CATCH COMPOSITION OF: (species) Largemouth Bass LAKE/RESERVOIR: Freeman

DATE: 7/7/95 PERIOD: ______

Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ I/M	Maturity ♀ I/M	Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ I/M	Maturity ♀ I/M
								340-349							
50-59								350-359							
60-69								360-369							
70-79								370-379							
80-89								380-389							
90-99								390-399							
100-109								400-409							
110-119								410-419							
120-129								420-429							
130-139								430-439							
140-149								440-449							
150-159								450-459							
160-169								460-469							
170-179								470-479							
180-189								480-489							
190-199								490-499	DSD						
200-209								500-509							
210-219								510-519							
220-229								520-529							
230-239								530-539							
240-249								540-549							
250-259	1.5	40	110		3&4+			550-559							
260-269								560-569							
270-279	0.75	20	130		4+			570-579							
280-289								580-589							
290-299	1.5	40	220		4&5+			590-599							
300-309								600-609							
310-319								610-619							
320-329								620-629							
330-339								TOTAL							

TOTAL CATCH PER EFFORT OF: GILL NET 5 ELECTROFISHING — TRAP NET 0

LOWLAND LAKES AND RESERVOIRS FISH SURVEY
SPECIES SUMMARY SHEET

ATCH COMPOSITION OF:(species) Rainbow LAKE/RESERVOIR: Freeman Lk

ATE: 7/7/95 PERIOD:

Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ I/M	Maturity ♀ I/M	Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ I/M	Maturity ♀ I/M
								340-349							
50-59								350-359							
60-69								360-369							
70-79								370-379							
80-89								380-389							
90-99								390-399							
100-109								400-409							
110-119								410-419							
120-129								420-429							
130-139								430-439							
140-149								440-449							
150-159								450-459							
160-169								460-469							
170-179								470-479							
180-189								480-489							
190-199								490-499							
200-209	0.75	1.8	40					500-509							
210-219	0.75	1.8	50					510-519							
220-229								520-529							
230-239	3.75	9.8	86					530-539							
240-249	6.0	15.7	102					540-549							
50-259	7.5	19.6	104					550-559							
60-269	6.0	15.7	123					560-569							
70-279	3.75	9.8	141					570-579							
80-289	3.75	9.8	174					580-589							
90-299	2.25	5.9	190					590-599							
00-309	1.5	3.9	185					600-609							
10-319	0.75	1.8	230					610-619							
20-329	0.75	1.8	290					620-629							
30-339	0.75	1.8	290					TOTAL	38.26	-	6,705				

TAL CATCH PER EFFORT OF: GILL NET 51 ELECTROFISHING - TRAP NET 0

LOWLAND LAKES AND RESERVOIRS FISH SURVEY
SPECIES SUMMARY SHEET

CATCH COMPOSITION OF: (species) Tiger Muskie LAKE/RESERVOIR: Freeman La

DATE: 7/7/95 PERIOD:

Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ I/M	Maturity ♀ I/M	Length range (mm)	No. per unit effort	%	mn wt. (gms)	Wr	Age(s)	Maturity ♂ I/M	Maturity ♀ I/M
								340-349							
50-59								350-359							
60-69								360-369							
70-79								370-379							
80-89								380-389							
90-99								390-399							
100-109								400-409							
110-119								410-419							
120-129								420-429							
130-139								430-439							
140-149								440-449							
150-159								450-459							
160-169								460-469							
170-179								470-479							
180-189								480-489							
190-199								490-499							
200-209								500-509							
210-219								510-519	0.75	100	750				
220-229								520-529							
230-239								530-539							
240-249								540-549							
250-259								550-559							
260-269								560-569							
270-279								570-579							
280-289								580-589							
290-299								590-599							
300-309								600-609							
310-319								610-619							
320-329								620-629							
330-339								TOTAL		-					

TOTAL CATCH PER EFFORT OF: GILL NET 1 ELECTROFISHING - TRAP NET 0

AGE AT LENGTH BACKCALCULATION DATA FORM

LAKE Freeman SPECIES LMB/BC/PE DATE COLLECTED 7/95

technician: ____________ date: 12/95 bony part: Scale

Eberbach (40X)____ Microfiche (42X) X Disecting scope (power ?)____

	env.#	len.	TOTAL AGE	scale measurement age-1	age-2	age-3	age-4	age-5	age-6	age-7	age-8	age-9	ed
LMB	1	250	3+	37	81	125							15
	2	250	3+	37	73	113							13
	3	250	4+	29	63	97	120						14
	4	270	4+	22	61	102	121						13
	5	290	5+	41	82	105	123	132					1
	6	290	4+	32	86	112	126						14
BC	1	280	3+	68	153	208							24
	2	300	3+	69	136	185							21
PE	1	210	4+	26	68	90	113						13
	2	260	4+	32	73	120	195						21
TM	3	510	3+	54	78	92							115

Appendix O. Impromptu creel census data collected on lakes in northern Idaho, 1995.

Lake (# officer visits)	Anglers interviewed	Hours fished	Catch rates (fish/hour)											
			RBT	CT	KOK	LT	BT	BK	LMB	BC	PE	NP	Misc	Total[a]
Antelope Lk (10)	34	71	0.15											0.15
Bloom Lk (2)	0													--
Blue Lk (1)	5	5									2.00			2.00
Bonner Lk (3)	9	7	0.14						1.00					1.14
Brush Lk (7)	28	57	0.40		0.02									0.42
Chase Lk (3)	9	2												--
Cocolalla Lk (21)	159	291	0.01	0.01				0.003	0.003	0.02	3.78		CC=0.02	3.86
Cocolalla Slough (19)	52	71							0.04	0.04	0.23		PS=0.01	0.52
Dawson Lk (5)	12	22								0.23				0.23
Dennick Lk (2)	0													
Denton Slough (2)	40	51												0.20
Freeman Lk (2)	4	7												
Gamble Lk (3)	4	8											PS=0.75	0.75
Granite Lk (1)	0													--
Herman Lk (2)	0													--
Hidden Lk (3)	8	16		0.19										0.19
Jewel Lk (21)	38	72	0.01	0.07							0.35			0.43
Kelso Lk (1)	66	79.5	0.13											0.13

Appendix O. Continued.

Lake (# officer visits)	Anglers interviewed	Hours fished	Catch rates (fish/hour)											
			RBT	CT	KOK	LT	BT	BK	LMB	BC	PE	NP	Misc	Total[a]
Livermore Lk (1)	0													--
LP Slough (11)	38	53	0.25											0.25
Mirror Lk (6)	19	30			0.20			0.60						0.80
Moose Lk (1)	6	2	1.50											1.50
Morton Slough (5)	28	23							0.17					0.22
Muskrat Lk (2)	0													--
Pend Oreille Lk (155)	2,032	8,071	0.008	0.009	0.125	0.009	0.001				0.002		WF=0.004	0.16
Perkins Lk (10)	20	37						0.03	0.60		0.08			0.70
Priest Lk (33)	170	365.5				0.33								0.33
Upper Priest Lk (1)	7	10												0
Robinson Lk (7)	31	44	0.23						0.20					0.25
Roman Nose #1 (1)	3	6						0.83						0.83
Roman Nose #2 (1)	0													--
Roman Nose #3 (1)	2	4												0
Round Lk - Bonner Co.(22)	133	217.2	0.09	>0.01				>0.01		0.04	2.30		PS=0.12	2.54

Appendix O. Continued

Lake (# officer visits)	Anglers interviewed	Hours fished	Catch rates (fish/hour)											
			RBT	CT	KOK	LT	BT	BK	LMB	BC	PE	NP	Misc	Total[a]
Sansoucci (4)	8	13	0.23					0.08						0.31
Shepard Lk (8)	15	30.6							0.03		1.34		PS=00.3	1.41
Sinclair Lk (2)	3	1												0
Smith Lk (16)	101	188.3	0.31		>0.01			0.02	0.01					0.34
Solomon Lk (9)	61	100	0.68											0.68
Spirit Lk (13)	74	244.1	0.04	>0.0 1	2.09				0.15				PS=0.05	2.33
Lower Twin Lk (5)	60	66	0.17	0.05					0.05	0.06	0.61		PS=0.22	0.94
Upper Twin Lk (6)	60	111	0.05	0.02				0.08	0.09		6.71		PS=0.02	6.96
Anderson Lk (5)	48	146							0.001	0.001		0.07		0.08
Benewah Lk (4)	39	91							0.2	4.3	0.9			5.5
Black Lk (1)	4	14							0.2	0.4		0.07		0.6
Blue Lk (Benewah County) (2)	18	17										0.06		[b]
Coeur d'Alene Lk (27)	757	1432		0.002					0.01	0.01	0.11	0.01	CK=0.03	0.58
Chatcolet Lk (8)	73	246							0.04	0.14	0.18	0.1		0.48
Fernan Lk (8)	83	125	0.1								0.08		CC=0.01	0.2
Hauser Lk (7)	113	199	0.14	0.01					0.04	0.07	0.02		CC= 0.01 PS=0.02	0.34

Appendix O . Continued.

Lake (# officer visits)	Anglers interviewed	Hours fished	Catch rates (fish/hour)											
			RBT	CT	KOK	LT	BT	BK	LMB	BC	PE	NP	Misc	Total[a]
Hayden Lk (7)	81	144	0.07	0.01					0.01				SMB=0.01	[b]
Thompson Lk (7)	28	90							0.04	0.02		0.03		0.1
Totals	4,583 anglers	13,795 h												

RBT = rainbow trout
CT = cutthroat trout
KOK = kokanee salmon
LT = lake trout
BT = bull trout
BK = brook trout
BN = brown trout
LMB = largemouth bass
BC = black crappie
CC = channel catfish
PE = yellow perch
PS = pumpkinseed sunfish
CK = chinook salmon
NP = northern pike
[a] may include other non-game species not listed above
[b] incomplete catch data

Appendix P. Angler narratives for Swan, Black, Rose, Kelso, Little Round, and Freeman lakes, Idaho, surveyed in 1995.

SWAN LAKE

Swan Lake is one the 'Chain Lakes' located in the Coeur d'Alene River flood plain. It is approximately 370 acres with a maximum depth of 18 ft. The lake is not very productive with an alkalinity value of 100 ppm. It is connected directly to the river by a small channel that is the only access for boats. There is a water control structure in this channel that restricts the size of the boats entering the lake in mid to late summer when it is closed.

The lake is a warmwater lake with largemouth bass, black crappie, northern pike, yellow perch, pumpkinseed and brown bullhead. Largemouth bass population is not as abundant as in some of the other 'Chain Lakes'. Most of the bass collected in June 1995 were less than 9 inches long. Crappie and yellow perch also tend to be on the small size. Extensive aquatic vegetation affects the fish populations in the lake and often results in undersized fish.

Extensive wetlands surround 70% of the lake. Abundant aquatic plants reduce open water to 50% of its 370 acres. However, the extensive wetlands are excellent habitat for waterfowl.

Spring runoff and winter rain-on-snow events cause flooding and cold water temperatures to persist to the end of June in some years. The cold water temperatures affect fish growth and sometimes newly hatched bass do not have a long enough growing season to reach the critical survival length of 4 inches before winter resulting in whole year classes of bass missing.

The lake basin is heavily contaminated with heavy metals, lead, zinc etc., from mine tailings in the South Fork Coeur d'Alene River which were washed downstream by spring runoff and rain-on-snow events. There have been warnings issued to reduce consumption of fish caught in the 'Chain Lakes'. Children, the elderly and pregnant women are advised not to eat any of the fish caught from this area.

BLACK LAKE

Black Lake is one of the 'Chain Lakes' located in the Coeur d'Alene River flood plain. It is 350 acres with a maximum depth of 21 ft. It has had a history of fish kills due to effluent runoff from an adjacent cattle operation creating large alga blooms. This effluent no longer enters the lake and the number of fish kills has been reduced. The lake is an unproductive body of water with alkalinity values of 100 ppm. The lake can be accessed through a channel from the Coeur d'Alene River and there is an unimproved boat ramp at the Black Lake Resort.

The lake is a warmwater lake with largemouth bass, black crappie, northern pike, yellow perch, pumpkinseed and brown bullhead. Largemouth bass population does not appear to be abundant. Most of the bass collected in June 1995 were less than 7 inches long. Crappie and yellow perch also tend to be on the small size. However, anglers have been able to catch 8 to 10 inch crappie, but inconsistently.

Spring runoff and winter rain-on-snow events cause flooding and cold water temperatures to persist to the end of June in some years. The cold water temperatures affect fish growth and sometimes newly hatched bass do not have a long enough growing season to reach the critical survival length of 4 inches before winter resulting in whole year classes of bass missing.

The lake basin is heavily contaminated with heavy metals, lead, zinc etc., from mine tailings in the South Fork Coeur d'Alene River which were washed downstream by spring runoff and rain-on-snow events. There have been warnings issued to reduce consumption of fish caught in the 'Chain Lakes'. Children, the elderly and pregnant women are advised not to eat any of the fish caught from this area.

ROSE LAKE

Rose Lake is one of the 'Chain Lakes' located in the Lower Coeur d'Alene River Valley. It is 350 acres and has a maximum depth of 30 ft. Like other northern Idaho lakes, it is relatively unproductive with an alkalinity value of 80 ppm. The water clarity was low with a maximum visibility of 4.6 ft. There are two boat ramps. This lake cannot be accessed directly from the Coeur d'Alene River like several of the other 'Chain Lakes'.

The lake is a warmwater lake with largemouth bass, black crappie, northern pike, bluegill, yellow perch, pumpkinseed and brown bullhead. Largemouth bass population does not appear to be abundant. However, the bass collected in June 1995 were well distributed throughout the length range of 2 - 15 inches. Most of the bass were longer than 8 inches.

Bluegill were first introduced in 1990 into Rose Lake to add another dimension to the fishery. Bluegill ranged in length from 1 to 7 inches and were 1 to 4 years of age. Most of the bluegill sampled were 4-6 inches long. There does appear to be natural reproduction occurring in the lake. Like most of the warmwater fish in northern Idaho, growth is slow and it may take 6 to 7 years before bluegill reach 9-10 inches.

Black crappie were not very abundant with the majority of fish sampled in the 6-9 inch range. Yellow perch ranged in length from 1-9 inches, with 20% of the fish sampled more than 8 inches.

The lake basin is heavily contaminated with heavy metals, lead, zinc etc., from mine tailings in the South Fork Coeur d'Alene River which were washed downstream by spring runoff and rain-on-snow events. There have been warnings issued to reduce consumption of fish caught in the 'Chain Lakes'. Children, the elderly and pregnant women are advised not to eat any of the fish caught from this area.

KELSO LAKE AND LITTLE ROUND LAKE

Kelso and Little Round lakes along with Granite Lake are found in the headwaters of the Hoodoo Creek drainage. All three lakes all lie at the same elevation of approximately 2200 feet. The three lakes are all connected by a low gradient swamp area. The general flow of the system appears to be though Kelso Lake during high water periods but during other times of the year, water from the three lakes subs into the aquifer. The outlet of Kelso Lake only flows overland to Hoodoo Creek during high water periods. The outlet of Little Round Lake enters Kelso Lake at its east end near the mouth of the Granite Lake outlet. Kelso Lake is the largest of the three at 61.2 acres compared with Little Round Lake at 9.4 acres and Granite Lake at 21 acres. Maximum depth of Kelso Lake is 48 feet. The maximum for Little Round Lake is 95 feet. Granite Lake has a maximum depth of 130 feet but only the upper 10 to 20 feet of the lake is useable by fish. Granite Lake is a meromictic lake with a chemocline at between 10 feet and 20 feet, depending on the time of year. The water below this chemocline is severely limited in oxygen concentration and thus limits the area fish can use. While Granite Lake was not surveyed for fish resources in 1995, it does support a population of warm water fish.

Kelso, Little Round and Granite lakes are managed with quality bass regulations; two bass limit, none between 12" and 16", January 1 to June 30 - closed to harvest. Fishing pressure on Kelso Lake can be quite high and hatchery supplementation with rainbow trout is made during the months of April, May and June. Little Round Lake access is limited by private land holdings between the county road and the lake. The only easy access to Little Round Lake is to launch a small boat off the county road right of way into the weed choked outlet of the lake. Consequently, Little Round Lake receives little fishing effort.

Kelso Lake received a stocking of 400 bluegill sunfish of various sizes 1982. The fishery survey of Kelso and Little Round lakes in 1995 shows that the introduction of bluegill to Kelso not only established a self reproducing population in Kelso Lake but the bluegill have pioneered into Little Round Lake as well.

During the fishery survey in 1995 four species of game fish and two species of non-game fish were sampled from Kelso Lake. Largemouth bass in the sample 21 inches. This fish was approximately 15 years old. Bluegill sunfish sampled from Kelso Lake averaged about 5 inches, the largest bluegill sampled was 6.5 inches long. The other four species of fish sampled in Kelso Lake were pumpkinseed sunfish, yellow perch, brown bullhead and tench. While no rainbow trout were found during the sample period, Kelso Lake does receive a hatchery stocking of 10,000 put-and-take rainbow trout each year during the months of April (4,000 fish), May (2,000 fish) and June (4,000 fish).

Fish species sampled in Little Round Lake included largemouth bass, up to 9 inches in length, bluegill sunfish, the largest was 8.5 inches long, and brook trout, ranging from 12.5 inches to 13.5 inches.

FREEMAN LAKE

Freeman Lake is a shallow 40 acres lake that is located in the Priest Lake drainage approximately 15 miles west of the town of Priest River. The average depth of Freeman Lake is less than six feet. The maximum depth is 17 feet. The shallow nature of Freeman Lake is very conducive to rooted aquatic vegetation and there is a distinct vegetation line around the lake at about the nine foot depth. Public access to the shoreline of Freeman Lake is limited to the southwest corner of the lake where the Idaho Department of Fish and Game owns approximately 590 yards of lake shoreline. Located on the Fish and Game property is a boat ramp for small boats and a fishing dock. Freeman Lake is a two story fishery supporting both a warm and cold water fishery. Management of the fishery is under general statewide fishing regulations with the exception of an electric motors only provision. The rainbow trout fishery in Freeman Lake is supported by an annual stocking of 5,000 put-and-take size R1- rainbow trout annually. These stockings take place in April (1,500 fish), May (1,500 fish), June (1,000), and September (1,000).

Tiger muskie were first introduced to Freeman Lake in 1989 with an initial stocking of 100 fish. Since that time another 195 tiger muskie have been stocked in Freeman Lake (110 fish in 1990, 35 in 1991 and 50 in 1993). Freeman Lake was surveyed on July 7, 1995, to evaluate the fishery community and the success of the tiger muskie introduction.

Six species of game fish were sampled from Freeman Lake during the fishery survey. Hatchery rainbow trout were the most frequently sampled fish. A total of 51 rainbow were collected, ranging in length from eight inches to 13.25 inches. All the rainbow appeared to be from the 1995 stockings. Other fish sampled included largemouth bass, black crappie, pumpkinseed sunfish, yellow perch and tiger muskie. None of the five largemouth bass sampled from Freeman Lake exceeded the 12 inch minimum length limit. The largest bass captured was 11.75 inches long. This is typical of general regulation bass waters in north Idaho, as soon as a bass reaches the minimum size limit they are harvested from the system. The two black crappie sampled from Freeman Lake measured 11 inches and 12 inches. Only one tiger muskie was captured during the sampling effort. This fish measured 20 inches and weighed one pound and 10 ounces. Anger reports from Freeman Lake indicate that legal size tiger muskie (30 inches in length and longer) are being taken annually. The few anglers that know how to catch tiger muskie from Freeman Lake are tight lipped about their success and an estimate of the tiger muskie harvest in not possible.

1995 ANNUAL PERFORMANCE REPORT

State of: Idaho

Program: Fisheries Management F-71-R-20

Project I: Surveys and Inventories

Subproject I-A: Panhandle Region

Job: c

Title: Rivers and Streams Investigations

Contract Period: July 1, 1995 to June 30, 1996

ABSTRACT

Westslope cutthroat trout *Oncorhynchus clarki lewisi* densities estimated from snorkeling transects in the catch-and-release sections of the North Fork Coeur d'Alene, Little North Fork Coeur d'Alene, and St. Joe rivers were 80, 5, and 277 trout/ha, respectively. In the catch-and-keep sections of the same streams, densities were 50, 5, and 35 trout/ha, respectively.

The number of trout estimated by electrofishing the St. Joe River catch-and-release transect was 318 trout/ha or 780 trout/km (1,249 trout/mile).

In the Pend Oreille drainage, 320 bull trout redds *Salvelinus confluentus* were counted in 1995. Twelve bull trout redds were counted in the Upper Priest Lake drainage in 1995. Seventy-three bull trout redds were counted in the upper St. Joe River drainage in 1995.

The number of kokanee *O. nerka kennerlyi* spawners counted in Smith, Boundary, Long Canyon, and Parker creeks in 1995 was 0, 1, 10, and 1, respectively.

Impromptu field checks of the effort and harvest of 384 anglers by conservation officers on streams in the Panhandle Region are summarized.

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OBJECTIVES

1. Estimate the trout density in selected snorkeling transects in the Little North Fork Coeur d'Alene and North Fork Coeur d'Alene rivers, and the St. Joe River annually. Compare trends with previously collected data.

2. Estimate population abundance of trout in the St. Joe River by electrofishing.

3. Assess the status of bull trout *Salvelinus confluentus* populations in Pend Oreille Lake, Priest Lake, and St. Joe River drainages based on abundance of bull trout redds in selected tributaries.

4. Monitor the abundance of spawning kokanee *Oncorhynchus nerka kennerlyi* in selected tributaries of the Kootenai River.

METHODS

Cutthroat Trout Densities

Snorkeling

Biologists snorkeled previously established transects in the North Fork Coeur d'Alene River (NFCDAR), the Little North Fork Coeur d'Alene River (LNFCDAR) (Lewynsky 1986) (Figure 1), and the St. Joe River (SJR) (Rankel 1971) (Figure 2). There were 28, 13, and 35 transects surveyed in NFCDAR, LNFCDAR, and SJR, respectively. The number of trout were recorded for each transect by species and length group, greater than 300 mm or less than 300 mm. Mountain whitefish *Prosopium williamsoni* were counted as adults and juveniles. Northern squawfish *Ptychocheilus oregonensis* and suckers *Catostomus sp.* were enumerated.

The length (m) and width (m) of each transect was measured to determine area (m^2) surveyed. Trout density was reported as fish/m^2, fish/100 m^2 and trout/ha.

Electrofishing

Two mark-and-recapture population estimates were conducted in the catch-and-release section of the St. Joe River to determine the feasibility of obtaining an accurate estimate. Two transects were selected for population estimates by electrofishing (Figure 1). A drift boat was used to carry the electrofishing equipment in the transect from 0.8 km upstream of Quartz Creek downstream to Eagle Creek, 6.0 km. This method required two people; an oarsman and a netter. A canoe was used to float the electrofishing equipment in the transect from Copper Creek downstream 1.0 km. This method required a minimum of five people; two netters, two for the electrodes, and one person to control the canoe and safety switch.

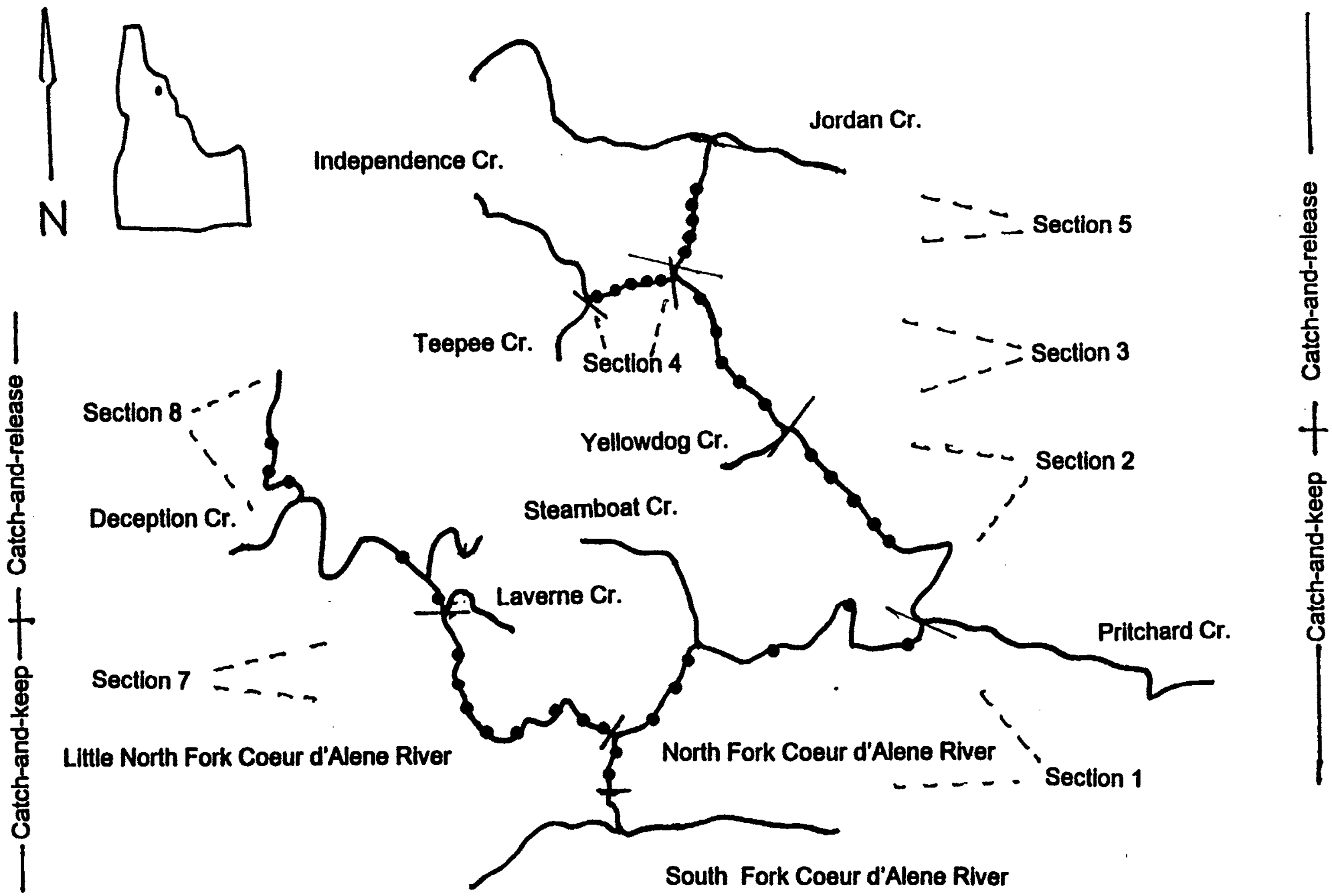

Figure 1. General location of snorkeling transects in the North Fork and Little North Fork Coeur d'Alene rivers, Idaho.

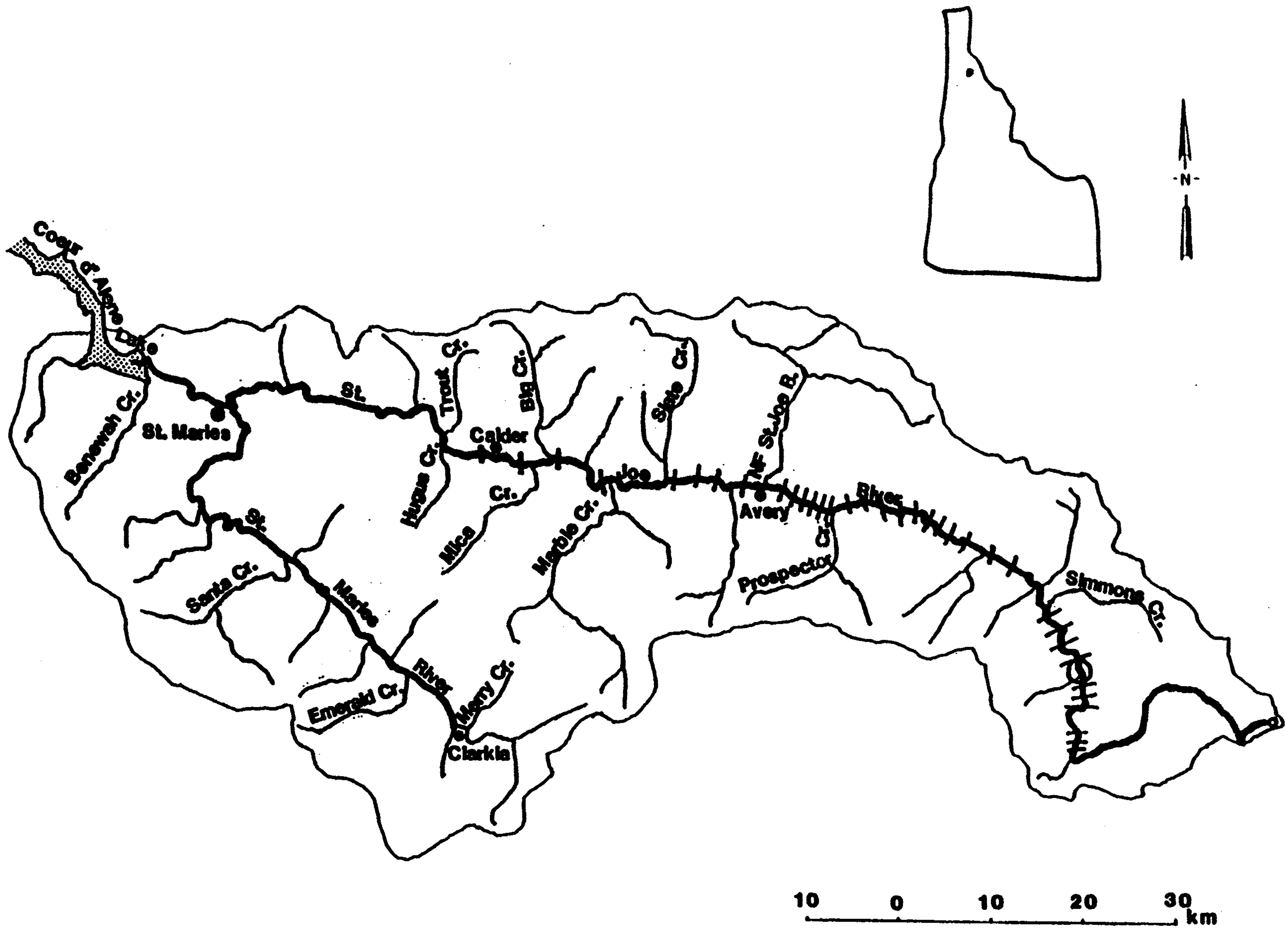

Figure 2. General locations of snorkeling transects on the St. Joe River, Idaho, 1995. (Circle indicates general location of electrofishing transect.)

canoe and safety switch. Electrofishing equipment included a VVP15 Coffelt variable voltage pulsator and 5,000-watt gasoline-powered generator. A Peterson mark/recapture estimate was made (Ricker 1975). On the first run, all fish collected were measured (total length [TL] mm) and marked with a hole punch in the caudal fin. The recapture run was conducted one week later. All fish collected were examined for a mark and lengths of fish were recorded.

Bull Trout Redd Counts

Bull trout redd counts have been conducted in the Pend Oreille Lake drainage since 1983 and in the Priest Lake and St. Joe River drainages since 1992 (Horner et al. 1996a) to monitor population trend information. Survey techniques and identification of bull trout redds followed methodology as described by Pratt (1984).

Standard Stream Surveys

Habitat surveys were conducted on three streams in the Priest River drainage in 1995. Following the methods described in the Idaho Department of Fish and Game "Standard Stream Survey" guidelines (Horner et al. 1997), the Middle Fork East River and two tributaries to the Middle Fork, Tralac and Uleada creeks, were surveyed in 1995. Surveyed stream reaches correspond to historic surveys (Horner et al. 1987). Equipment failure precluded the use of the backpack electrofisher, and no fisheries information was gathered.

RESULTS AND DISCUSSION

Cutthroat Trout Densities

North Fork Coeur d'Alene River

Snorkeling - The estimated density of westslope cutthroat trout *O. clarki lewisi* was 80 fish/ha and 50 fish/ha in the catch-and-release and the catch-and-keep sections, respectively (Table 1, Figure 3). The summary of fish observed and fish densities per transect are displayed in Appendices A and B. The density of trout larger than 300 mm was higher in the catch-and-release section (9 fish/ha) than in the catch-and-keep section (1 fish/ha), where a one cutthroat trout, 14-inch minimum size regulation was in effect (Figure 3).

Table 1. Summary of westslope cutthroat trout densities counted in snorkeling transects in the North Fork Coeur d'Alene, Little North Fork Coeur d'Alene and the St. Joe rivers, Idaho, August 1995.

North Fork Coeur d'Alene River

	Fish Size	Cutthroat counted	Transect length (km)	Number counted/ km	Area (ha)	No. counted/ ha
Catch-and-keep	≤ 300 mm	288	1.95	148	5.9	49
	> 300 mm	6	1.95	3	5.9	1
				151		50
Catch-and-release	≤ 300 mm	157	1.4	112	2.2	71
	> 300 mm	20	1.4	14	2.2	9
				126		80

Little North Fork Coeur d'Alene River

	Fish Size	Cutthroat counted	Transect length (km)	Number counted/ km	Area (ha)	No. counted/ ha
Catch-and-keep	≤ 300 mm	6	0.81	10	1.3	5
	> 300 mm	0	0.81	0	1.6	0
				10		5
Catch-and-release	≤ 300 mm	2	.33	6	0.40	5
	> 300 mm	0	.33	0	0.40	0
				6		5

Table 1. Continued

St. Joe River

	Fish Size	Cutthroat counted	Transect length (km)	Number counted/ km	Area (ha)	No. counted/ ha
Catch- and-keep	≤ 300 mm	178	1.6	111	5.6	32
	> 300 mm	16	1.6	10	5.6	3
				121		35
Catch- and- release	≤ 300 mm	787	1.8	437	3.4	231
	> 300 mm	158	1.8	88	3.4	46
				295		277

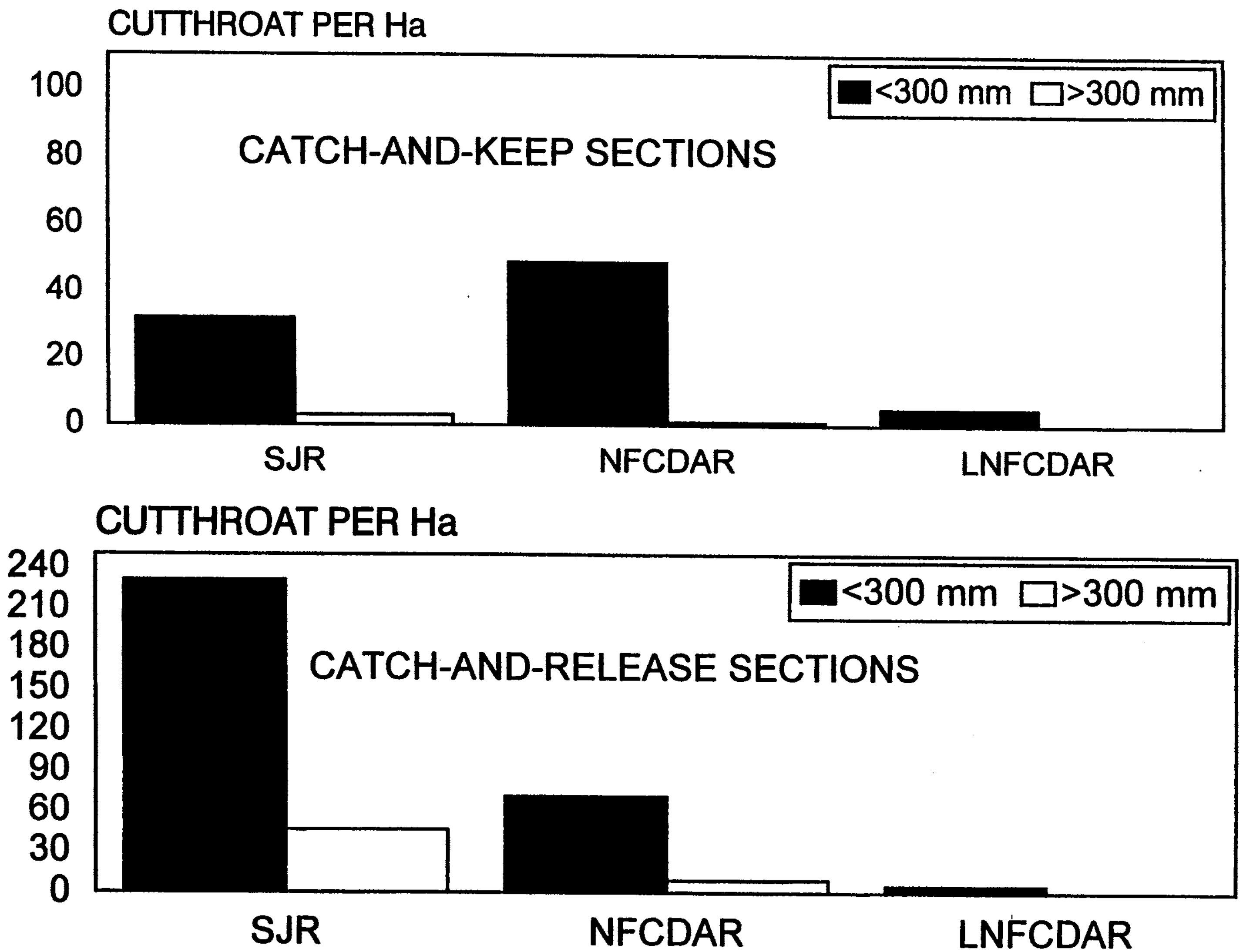

Figure 3. Number of westslope cutthroat trout per hectare observed by snorkeling selected transects in the St. Joe River (SJR), North Fork Coeur d'Alene River (NFCDAR), and Little North Fork Coeur d'Alene River (LNFCDAR), Idaho, 1995. The regulation in the catch-and-keep sections allowed harvest of one cutthroat trout, 14 inches minimum length.

Little North Fork Coeur d'Alene River

Snorkeling - Only eight westslope cutthroat trout were observed in the LNFCDAR. The estimated density of westslope cutthroat trout was 5 fish/ha in both the catch-and-release and the catch-and-keep sections, respectively (Table 2). The number of cutthroat trout per transect continued to be low relative to other waters with similar fishing regulations (Figure 3). No cutthroat trout larger than 300 mm were observed. Appendix C displays the number of fish observed and the density per transect.

St. Joe River

Snorkeling - Estimated densities of westslope cutthroat trout were 277 fish/ha and 35 fish/ha in the catch-and-release and the catch-and-keep sections of the SJR, respectively (Figure 3). The density of cutthroat trout greater than 300 mm was 46 fish/ha and 3 fish/ha in the catch-and-release and the catch-and-keep sections of the SJR, respectively. This difference may be attributed, in part, to harvest of trout more than 356 mm TL. A summary of fish observed and estimated fish densities for each transect are displayed in Appendices D and E.

The number of westslope cutthroat trout counted per transect was more in 1995 than in 1994 for the NFCDAR and the St. Joe River (Tables 3 and 4). It appears that trout abundance in the snorkeling transects is influenced by water levels and water temperatures. In 1994, water temperature reached afternoon highs in the mid 20's °C (mid 70's °F). This may have forced cutthroat trout to seek cooler water in tributaries which were not surveyed. In 1995, water temperatures reached afternoon highs in the mid to upper teens °C (lower 60's °F). This allowed trout to remain in the areas snorkeled and not seek out the cooler tributaries.

The lack of instream trout cover, i.e., deep pools, large woody debris, in the LNFCDAR and NFCDAR probably contributes to the lack of cutthroat trout in these rivers. More cutthroat trout were observed in the SJR than in the LNFCDAR and NFCDAR in 1995. The densities of cutthroat trout in snorkeling transects in the unroaded catch-and-release section of the SJR (0.03 fish/m^2 in the Spruce to Ruby Creek section) (Table 4) were much higher than in the unroaded catch-and-release section of the NFCDAR (0.005 fish/m^2 in the Teepee Creek to Jordan Creek section) (Table 3). We believe higher densities in the SJR were a result of more pools and large woody debris that provided cover for cutthroat trout in the mainstem river. The cutthroat trout densities in snorkeling transects located in the roaded sections were similar, although slightly more in the SJR (0.03 fish/m^2 from Prospector Creek to Spruce Tree Campground) (Table 4) than in the NFCDAR (0.02 fish/m^2 from Yellowdog Creek to Teepee Creek) (Table 3). This was an indication that habitat may be similar in sections of both these rivers.

There was a wide range of cutthroat trout densities within the catch-and-release section of the NFCDAR (Table 3). Cutthroat trout densities in snorkeling transects in the unroaded section (0.005 fish/m^2 from Teepee Creek upstream to Jordan Creek) was much less than in the roaded section (0.02 fish/m^2 from Teepee Creek downstream to Yellowdog Creek). This was an indication that habitat was very different in these two sections of river. The habitat in the unroaded section appeared to be dominated by long riffles and shallow glides with very few pools. There were more pools in the roaded section. However, both sections were almost devoid of woody debris.

Table 2. Mean number of westslope cutthroat trout counted in snorkeling transects (fish/m^2) in the Little North Fork Coeur d'Alene River, Idaho, for 1973, 1980-81, 1988, 1991, and 1993-1995.

	Year							
River section	1973	1980	1981	1988[b]	1991[c]	1993[d]	1994	1995
Mouth to Horse Heaven	5.6[a]	5.9[a]	7.5[a]	2.7	3.9	3.8 $\pm$ 4.6 (0.002)	2.1 $\pm$ 1.7 (0.001)	0.6 $\pm$ 2 (0.0004)
Mouth to Laverne Creek	--	--	0.8[e]	1.0	3.3 $\pm$ 5.1	3.3 $\pm$ 5.1 (0.002)	0.6 $\pm$ 0.8 (0.0003)	0.9 $\pm$ 4 (0.0004)
Lavern to Deception Creek	--	--	3.8[e,f]	7.4[f]	1.5 $\pm$ 5.3	0.5 $\pm$ 9.0 (0.0003)	4.0 $\pm$ 5.0 (0.003)	0
Deception to Horse Heaven	--	--	--	--	5.3 $\pm$ 10.5	--	4.7 $\pm$ 6.3 (0.006)	0.7 $\pm$ 10 (0.0008)

[a] Average value for July, August, and September sampling.
[b] July 20 sampling.
[c] August 21-25 sampling.
[d] July 29 sampling.
[e] Average value for 1980-1981.
[f] Densities from transects from Laverne Creek to Iron Creek.

Table 3. Mean number of westslope cutthroat trout counted in snorkeling transects (fish/m^2) in the North Fork Coeur d'Alene River, Idaho, 1973, 1980-81, 1987-88, 1991, and 1993-1995.

	Year								
River section	1973[a]	1980[a]	1981[a]	1987[b]	1988[c]	1991[d]	1993[e]	1994	1995
Confluence of South Fork Cd'A River to Yellowdog Creek	2.4	0.5	0.9	--	1.4	7.5 ± 5.0	22 ± 10.4 (0.003)	15 ± 6.3 (0.003)	18 ± 18 (0.005)
Yellowdog to Tepee Creek	11.2	6.8	5.7	25.4	27.3	28.4 ± 19.4	9 ± 9.2 (0.004)	33±34 (0.02)	31 ± 85 (0.02)
Tepee Creek to Jordan Creek	6.0[f]	5.6[f]	5.7[f]	16.4	3.2	1.5 ± 3	2.7 ± 7.6 (0.003)	11.8±17 (0.01)	4 ± 17 (0.005)
Tepee Creek mouth to Independence Creek	0	1.6	3.9	2.2	1.2	2.6 ± 1.5	3.2 ± 4.5 (0.002)	2.0±205 (0.001)	1 ± 3 (0.0005)
Confluence of South Fork Cd'A River to Jordan Creek (including Tepee Creek)	4.6	3.2	3.4	--	10 ± 19	8.6 ± 4.3	14 ± 6.1 (0.003)	15.5±8 (0.005)	15 ± 12 (0.005)

[a]Average value for July, August, and September sampling.
[b]August sampling.
[c]July 20-24 sampling.
[d]August sampling.
[e]July 18 - August 4 sampling.
[f]Fish per transect calculated for Tepee Creek to Cow Creek.

Table 4. Mean number of westslope cutthroat trout counted in snorkeling transects (fish/m²) in the St. Joe River, Idaho, 1969-77, 1979-80, 1982, 1990, and 1993-1995.

Stream section	Year										
	1974	1975	1976	1977	1979	1980	1982	1990	1993	1994	1995
Prospector to Spruce Tree Campground	27.0	28.9	48.8	32.6	29.8	28.3	55.4	52.8 ± 13.1 (0.03)	40.3 ± 11.8 (0.02)	29.4±10.7 (0.02)	46 ±20 (0.03)
Spruce to Ruby Creek	59.0	74	22.8	55.8	38.0	17.6	40.0	49 ± 26 (0.03)	14 ± 10 (0.01)	9.8±11.1 (0.009)	28 ±32 (0.03)
Prospector to Ruby Creek	--	--	--	--	--	--	--	51.7 ± 10.6 (0.04)	32.9 ± 10.1 (0.02)	23.8±9.0 (0.02)	41 ±21 (0.03)
Calder to Avery	--	--	--	--	--	--	--	1.6 ± 1.6 (0.000.2)	4.4 ± 6.1 (0.001)	12.4±11.8 (0.002)	9±21 (0.002)
Avery to Prospector	4.0	3.4	--	2.0	3.3	4.7	1.1	12 ± 7.6 (0.0002)	21.3 ± 13.6 (0.005)	7.7±4.1 (0.004)	19±31 (0.008)
Calder to Prospector Creek	--	--	--	--	--	--	--	5.9 ± 4.2 (0.002)	11.4 ± 7.4 (0.0002)	10.1±5.5 (0.001)	14±15 (0.01)
Calder to Ruby Creek	--	--	--	--	--	--	--	35 ± 10.3	24.3 ± 7.4	18.3±5.9 (0.007)	30±12 (0.01)

The differences in cutthroat trout densities between the SJR and NFCDAR and within the catch-and-release sections of the NFCDAR appeared to be related to habitat quality. Cutthroat trout densities were greater where habitat quality appeared to be adequate, and the better the habitat the higher the cutthroat trout densities. Where habitat quality appeared poor, cutthroat trout densities were low. Fishing regulations, i.e. catch-and-release, will not improve cutthroat trout densities when trout habitat is poor.

Electrofishing - The first Peterson population estimate was conducted on July 11, 1995 in the transect which started 0.8 km above the confluence of Quartz Creek. Water level at the time of the estimate was 2.4 m at the gage under the bridge at the Avery Ranger District office. The recapture run was conducted on July 17, 1995. Ninety-nine westslope cutthroat trout were captured during the first run. Ninety-nine westslope cutthroat trout, including three recaptured fish, were captured during the recapture run. A population estimate could not be calculated due to the low number of recaptured fish.

Conducting a mark-and-recapture population estimate at this time was not feasible. The time of the year is critical when conducting a Peterson population estimate on westslope cutthroat trout in the St. Joe River. One assumption for the estimate to be valid is that there is no emigration or immigration. Hunt and Bjornn (1992) reported that westslope cutthroat trout migrate upstream until August. Therefore, population estimates conducted before the end of this migration period would violate the "no emigration/immigration" assumption.

Water level is very critical if a drift boat is used to carry the equipment and personnel. The minimum water level is 2.4 m (8 feet) on the gage. Otherwise, areas become impassable for a drift boat. Using a drift boat would depend on adequate flows and proper timing. Typically water levels are below the minimum needed when westslope cutthroat trout have stopped migrating. Drift boats could be used in years when water levels and migration patterns coincide. If water levels and migration patterns coincide, at least two marking runs would provide more fish to be recaptured allowing a population estimate to be calculated.

A second population estimate was conducted on August 2 and 8, 1995. A canoe was used to carry the electrofishing equipment from Copper Creek downstream 1.0 km, an area of 2.6 ha. The estimated population of westslope cutthroat trout 80 mm to 179 mm was 720 (277 fish/ha) and for westslope cutthroat trout greater than 179 mm the population estimate was 238 (92 fish/ha). The total population estimate for cutthroat trout was 826 (318 fish/ha, 780 fish/km, or 1,249 fish/mile). The population estimates for fish under and over 179 mm were calculated using size-selection bias (relative vulnerability to the electrofishing gear). Small trout, <179 mm, are less vulnerable than trout greater than 179 mm (Vincent 1971).

We attempted to compare the number of fish observed while snorkeling and the number of fish estimated by electrofishing. During the first electrofishing run on August 2, two divers drifted downstream ahead of the electrofishing crew and counted cutthroat trout while snorkeling. The two divers observed a total of 454 cutthroat trout in one mile of stream. The population estimate showed there were 1,249 cutthroat trout per mile. In this case, divers counted 36% of the estimated cutthroat trout present in the electrofishing transect. This was an observation, not an attempt to develop a correlation between the two abundance estimates. Several additional comparisons are needed to detect a statistical relationship between electrofishing and snorkeling.

Otoliths were taken from a sample of 80 westslope cutthroat trout, ranging in length from 97 mm to 389 mm. Ages ranged from 2 to 8, and age 4 was the most abundant age (Figure 4). Bjornn (1961) reported that 4-year-old cutthroat trout comprised most of the angler-caught fish in Priest Lake. Rankel (1971) reported age class 3 cutthroat trout was the most abundant age group in the St. Joe River. Length ranges for each age group were wide. The length range for age 3 cutthroat trout was 120-220 mm, age 4 ranged 140-270 mm (Figure 5). The length range for age 5 seemed to be split into two groups, 190-250 mm and 280-340 mm. This may reflect different stocks of westslope cutthroat trout, fluvial or resident. The larger size group of five-year-olds may be fluvial westslope cutthroat trout and the smaller may be resident. Fluvial cutthroat trout have the opportunity to gather more food items because of the migration patterns allowing for faster growth rates. Resident cutthroat trout tend to remain in a smaller area, and food items may not be as abundant resulting in slower growth. Because growth rates in the lake may be faster than for the resident group of cutthroat trout. There are no phenotypical differences between the groups of westslope cutthroat trout to separate them. The main difference is behavioral. Fluvial cutthroat trout live in the river and migrate upstream to spawn and spend the summer, then they return downstream in the fall to overwinter. Resident cutthroat trout typically live in tributaries and upper portion of the river. They do not migrate to spawn, as the fluvial cutthroat trout. A third stock of cutthroat trout occurs in the St. Joe River system. Adfluvial cutthroat trout live in the lake and migrate into the stream to spawn in the lower tributaries in late April and May and return to the lake. Juvenile adfluvial cutthroat trout will remain in the tributaries until their second or third year when they migrate down to the lake to mature.

Bull Trout Redd Counts

Pend Oreille Lake Drainage

Bull trout redd counts in the Pend Oreille Lake drainage in 1995 were the lowest ever recorded. Three hundred twenty redds were observed in the 17 tributary streams surveyed (Table 5). Redd counts in the six index streams totaled 273 redds (Table 5). Using the expansion factor of 3.2 fish/redd, an estimated 874 bull trout entered the six index streams to spawn in 1995. The estimated spawning escapement for bull trout in the 17 tributaries surveyed in the Pend Oreille Lake drainage in 1995 was 1,024. Observation conditions during the survey period, mid to late October, were poor due to overcast skies, rain events, and resultant runoff. Five of the survey reaches were surveyed a second time (Table 5) and the highest count recorded. The difference in the observed number of redds from the two separate counts was minimal on all streams. While the visual clarity of the streams was low, it is thought that most of the redds present were identified.

Trestle Creek accounted for nearly 50% of the bull trout redds observed in the Pend Oreille Lake drainage in 1995. The 140 redds identified in 1995 were 50% below the Trestle Creek count for 1994 (276 redds). The 1995 spawning escapement into Trestle Creek, and perhaps the entire Pend Oreille system, correlates to what might be a depressed spawning year class. Comparing 1995, 1992, 1989, and 1986 (every third year) redd counts to other annual counts, a trend can be seen (Table 5). To worsen the condition of this depressed spawning year class, there were two major winter rain-on-snow storm events in December 1995 and February 1996 that did extensive damage to stream systems throughout north Idaho. It is too soon to evaluate fully that damage but it can be assured that bull trout eggs and juveniles suffered increased mortalities.

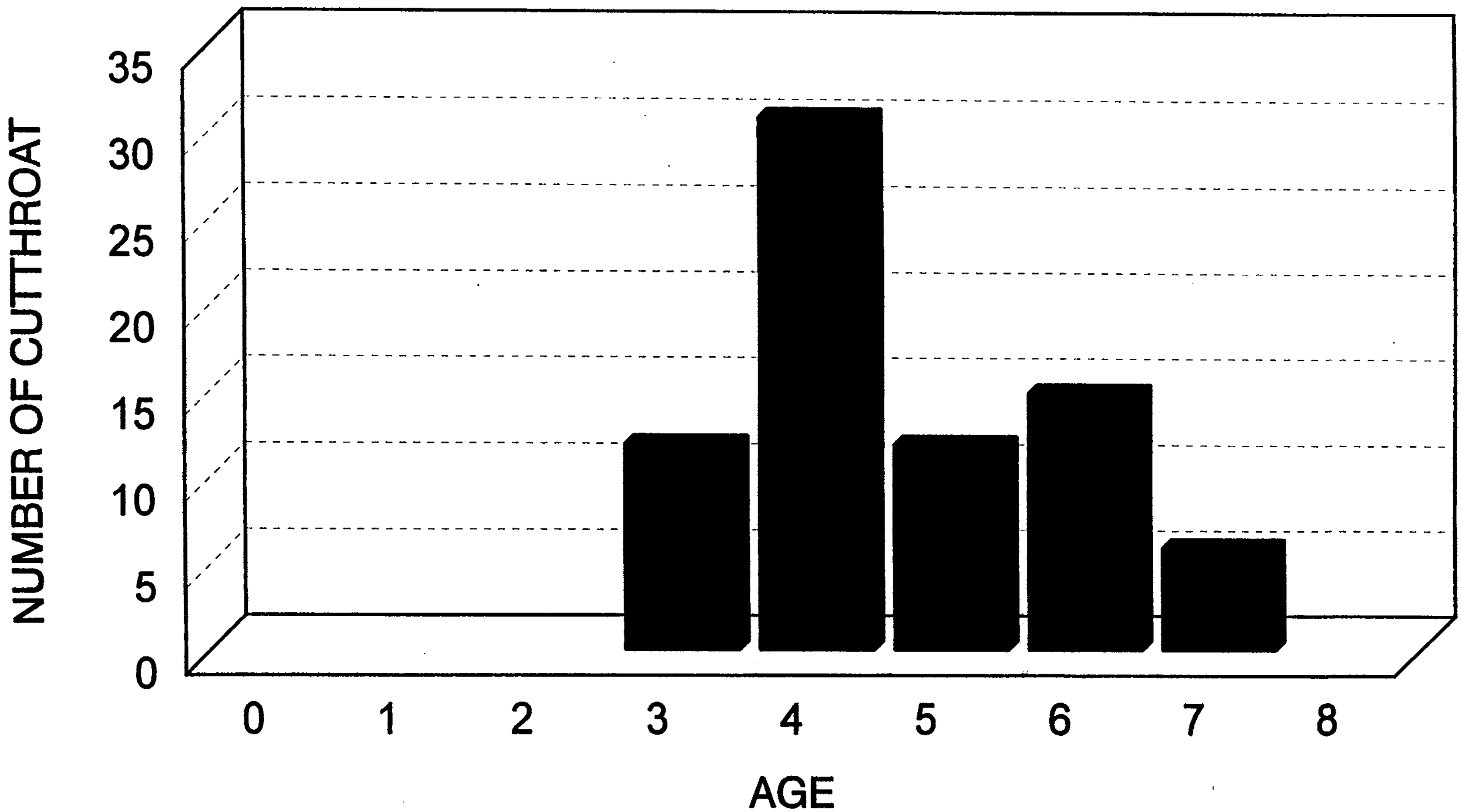

Figure 4. Age frequency of westslope cutthroat trout collected by electrofishing in the catch-and-release section of the St. Joe River, Idaho, 1995.

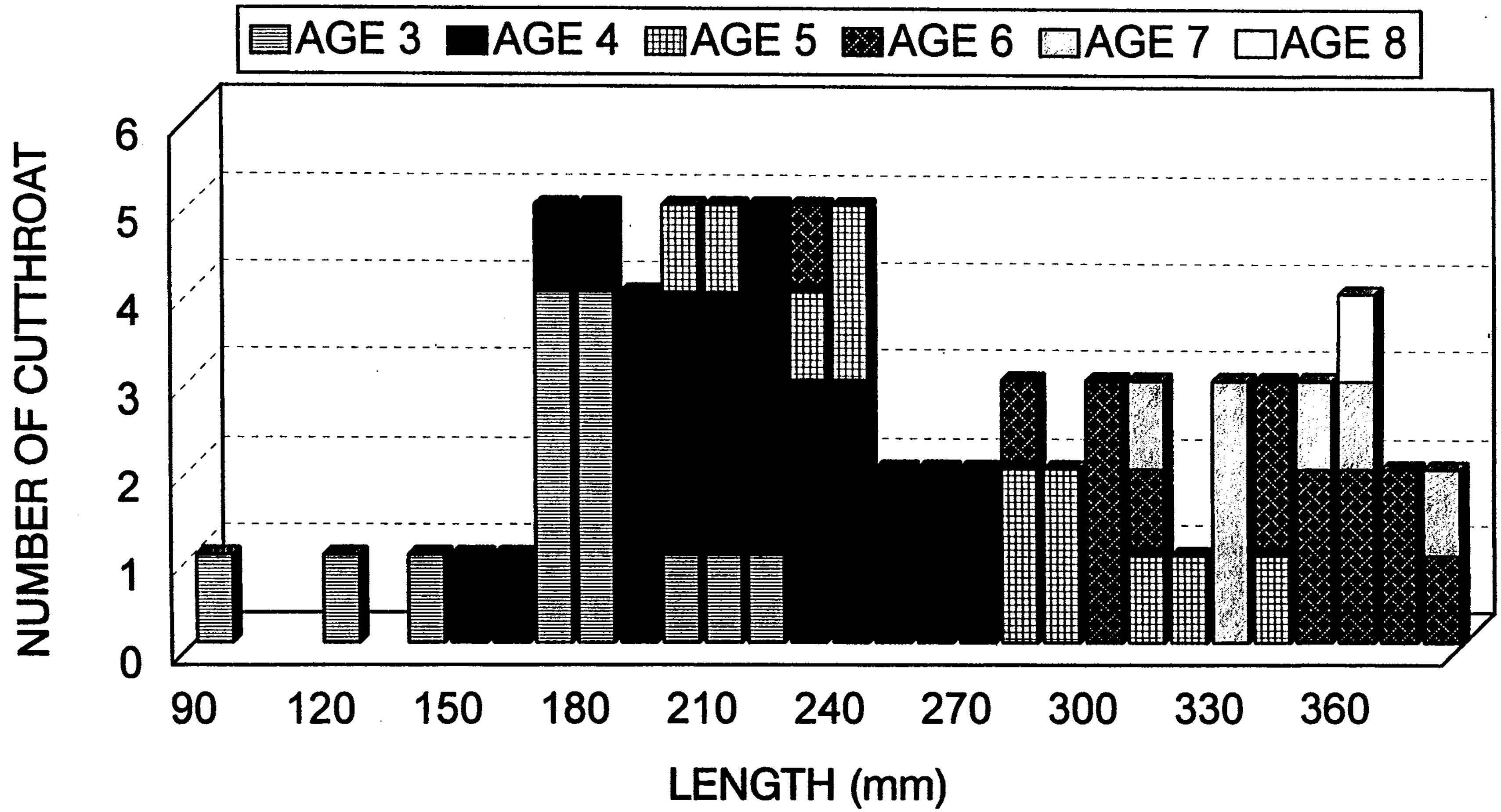

Figure 5. Length range of aged westslope cutthroat trout collected by electrofishing in the catch-and-release section of the St. Joe River, Idaho, 1995.

Table 5. Number of bull trout redds counted per stream in the Pend Oreille Lake, Idaho, drainage, 1983-1995.

Area Stream	Total redds counted 1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
CLARK FORK RIVER	-	-	-	-	-	-	-	-	-	2	8	11	18[f]
Lightning Creek	28	9	46	14	4	-	-	-	-	11	2	5	0[d,e]
Spring Creek	0	-	0	-	-	-	-	-	-	-	-	-	-
East Fork	110	24	132	8	59	79	100	29	-[a]	32	27	28	3[d,e]
Savage Creek	36	12	29	-	0	-	-	-	-	1	6	6	0[d]
Char Creek	18	9	11	0	2	-	-	-	-	9	37	13	2[d,e]
Porcupine Creek	37	52	32	1	9	-	-	-	-	4	6	1	2[d]
Wellington Creek	21	18	15	7	2	-	-	-	-	9	4	9	1[d,e]
Rattle Creek	51	32	21	10	35	-	-	-	-	10	8	0	1[d]
Johnson Creek	13	33	23	36	10	4	17	33	25	16	23	3	4[d]
Twin Creek	7	25	5	28	0	-	-	-	-	3	4	0	5[d]
NORTH SHORE													
Trestle Creek	298	272	298	147	230	236	217	274	220	134	304	276	140[d]
Pack River	34	37	49	25	14	-	-	-	-	65	21	22	0[d,e]
Rapid Lightning Creek	-	0	-	0	-	-	-	-	-	-	-	-	-
Grouse Creek	2	108	55	13	56	24	50	48	33[b]	17	23	18	0[d]
Hellroaring Creek	0	-	0	-	-	-	-	-	-	-	-	-	-
Jeru Creek	0	-	0	-	-	-	-	-	-	-	-	-	-
EAST SHORE													
Granite Creek	3	81	37	37	30	-	-	-	-	0	7	11	9[d]
Sulivan Springs	9	8	14	-	6	-	-	-	-	0	24	31	9
North Gold Creek	16	37	52	8	36	24	37	35	41	41	32	27	31
Gold Creek	131	124	111	78	62	111	122	84	104	93	120	164	95
Total 6 index streams	570	598	671	290	453	478	543	503	423[c]	333	529	516	273
Total all streams	814	881	930	412	555	-	-	-	-	447	656	625	320

1983 and 1984 data reported by Pratt (1985).
1985 and 1986 data reported by Hoelscher and Bjornn (1989).
[a] Not surveyed in 1991 due to early snow fall.
[b] Upper section not surveyed, count is from Chute Creek downstream.
[c] Represents only a partial count due to early snow fall.
[d] Observation conditions impaired by high runoff.
[e] Stream counted twice in 1995, highest redd count reported.
[f] Two counts made on same date, one by walking shoreline (7 redds observed) and one by snorkeling (18 redds observed).

The only stream system surveyed in 1995 that showed an increase in redd numbers was the Clark Fork River. This observed increase is, in part, due to the survey method. The 18 recorded bull trout redds in the Clark Fork River are all in the spawning channel located downstream from Cabinet Gorge Dam. This section was snorkeled several times a week by Washington Water Power biologists. Stream side counts, as used with all the other survey sections, through this section only detected 7 of the 18 redds.

Priest Lake Drainage

Only 12 bull trout redds were observed in the 12 surveyed tributaries of Upper Priest Lake in 1995 (Table 6). No tributaries to lower Priest Lake were surveyed in 1995. The 1995 count is the lowest on recent record (Table 6). Using the expansion value of 3.2 fish/redd, an estimated 38 bull trout comprised the spawning escapement to the 12 surveyed streams in the Upper Priest Lake drainage.

St. Joe River Drainage

In the upper St. Joe River drainage, 73 bull trout redds were observed in 1995 (Table 7). Expanding the number of redds observed by 3.2 fish/redd, an estimated 234 bull trout spawned in the surveyed reaches of the upper St. Joe River drainage in 1995.

Five index streams (Table 7) were selected to begin long-term monitoring. These streams were also selected to compare redd counts completed by volunteers. Three of the five streams had comparison counts. In all cases, volunteers counted more bull trout redds than Department personnel. Interpretation of the resulting redd counts must be carefully considered. Using inexperienced volunteers may bias results.

Little North Fork Clearwater River

The U.S. Bureau of Land Management and the Idaho Department of Fish and Game cooperated in a cost share program to survey four tributaries of the Little North Fork Clearwater River (LNFCR) and the upper portion of the LNFCR to document and quantify bull trout abundance. Thirteen bull trout were observed, three juveniles, and ten adults (Appendix F). Densities of bull trout observed while snorkeling are presented in Appendix F.

Spawning escapements for bull trout throughout north Idaho in 1995 were at record lows. The result of the bull trout redd surveys verifies the declining numbers of bull trout in the region. While habitat degradation is the major causal factor in the decline of bull trout, the Idaho Department of Fish and Game will close the last remaining catch-and-keep bull trout fishery in Idaho in 1996. Lake Pend Oreille and the lower Clark Fork River have allowed for the harvest of one bull trout/day, 20 inches in length or greater. This fishery will be closed to harvest January 1, 1996.

Table 6. Description of bull trout redd survey locations including transect description, distance surveyed, and number of redds observed in the Priest Lake, Idaho, drainage 1995. Surveys were conducted between September 20 and October 2, 1995. Number of bull trout redds observed in the 1992 through 1994 surveys are also presented.

	Survey		Number of redds observed			
Stream	Transect description	Distance (km)	1992	1993	1994	1995
Upper Priest R.	Mouth of Rock Cr. Downstream to F.S. trail 317 crossing	0.3	--	2	1	1
	Mouth of Lime Cr. Downstream to the mouth of Snow Cr.	3.2	--	3	4	2
	Togo Gulch to the mouth	0.8	--	0	0	--
Rock Cr.	Mouth upstream to F.S. trail 308 crossing	0.5	0	0	--	--
Lime Cr.	Mouth upstream approximately 0.8 km	0.8	0	0	--	--
Cedar Cr.	Mouth upstream approximately 1.6 km	1.6	--	0	2	1
Ruby Cr.	Mouth upstream to a barrier waterfall upstream from F.S. Road 655	2.0	0	0	--	--
Hughes Cr.	North end of Hughes Meadows upstream to F.S. Trail 312 crossing	2.0	7	3	2	0
	Foot bridge on F.S. Trail 311 downstream to F.S. Road 622 bridge	2.4	2	0	7	1
	F.S. Road 622 downstream to the mouth	8.0	--	1	--	--
Bench Cr.	Mouth upstream approximately 0.8 km	0.8	0	2	2	0
Jackson Cr.	Mouth upstream to F.S. Trail 311 crossing	1.6	4	0	0	0
Gold Cr.	Mouth upstream approximately 2 km	2.0	5	2	6	5
Boulder Cr.	Mouth upstream approximately 1.6 km to a barrier waterfall	1.6	0	0	0	--
Trapper Cr.	Mouth upstream to approximately 0.8 km upstream from East Fork	3.2	--	4	4	2
Caribou Cr.	Mouth upstream to old road crossing	1.6	--	1	0	0
	Totals		18	18	28	12

Transect survey descriptions are not necessarily the same for the 1992 counts.

Table 7. Number of bull trout redds counted in tributaries to the upper St. Joe River drainage, Idaho, 1992-1995. Number in ( ) indicates number of bull trout redds counted by IDFG personnel.

Stream	Number of redds[a] observed			
	1992[b]	1993[c]	1994[d]	1995[e]
St. Joe River from Spruce Tree Campground to Bean Cr.	--	--	--	4
St. Joe River from Bean Creek To Heller Creek	0	0	--	--
St. Joe River from Heller Creek To St. Joe Lake [f]	10	14	3	--(20)
Bacon Creek	0	0	--	0
Bean Creek	14	0	--	0
Beaver Creek And Bad Bear Creek	2	2	0	0
Broken Leg Creek	--	--	--	0
California Creek[f]	2	4	--	2(1)
Fly Creek	--	--	--	0
Gold Creek	--	2	--	0
Heller Creek	0	0	--	0
Indian Creek	--	0	0	--
Medicine Creek[f]	11	33	48	26(17)
Mosquito Creek	--	--	--	0
Red Ives Creek	--	0	--	1
Ruby Creek	0	1	--	8
Sherlock Creek	0	3	--	2
Simmons Creek	--	7	5	0
Simmons Creek (3 Lakes Creek to Washout Creek)[f]	--	--	--	5(0)
Washout Creek	--	3	0	0
Wampus Creek	--	0	0	--
North Fork Simmons Creek[f]	--	0	1	--(0)
Timber Creek	--	0	1	0
Wisdom Creek	1	1	4	5
Yankee Bar Creek	1	0	--	--
Totals	57	71	61	73

[a] Only definite bull trout redd sightings are reported in this table. Bright/clean gravel areas reported as "possible" bull trout redds are not included.

[b] 1992 survey date was September 25.

[c] 1993 survey date was October 3.

[d] 1994 survey date was September 24.

[e] 1995 survey date was September 30.

[f] Bull trout index streams established in 1995.

Standard Stream Surveys

Middle Fork East River, Tarlac Creek, and Uleada Creek

Habitat information was collected on three streams in the lower Priest River drainage. Middle Fork East River, Tarlac Creek, and Uleada Creek were surveyed August 2, 1995 (Figure 6). The 100 m surveyed reach of the Middle Fork East River is located immediately upstream from the mouth of Tarlac Creek. Stream discharge at the time of survey was estimated at 54 cfs with a midday water temperature of 11°C taken. Substrate composition consisted of 20% boulder, 50% rubble, and 30% cobble. Thick riparian vegetation lined the stream channel and included alder, hawthorn, and other deciduous shrubs and coniferous trees with an abundance of western red cedar. Stream gradient through this moderately steep "V" shaped canyon is approximately 2%. The Middle Fork road runs next to the Middle Fork East River, sometimes as close as several meters. Some stream channel degradation can be seen where road construction/maintenance has pushed fill material into the stream. The overall character of the upper reaches of the Middle Fork East River is one of moderate to high gradient consisting of a riffle - run/glide complex with limited pocket water.

The 100 m surveyed section of Tarlac Creek, a tributary to the Middle Fork East River, is located 8.85 road km upstream from the Middle Fork East River. At the time of survey, stream discharge was estimated at 1.7 cfs with a water temperature of 10°C. Stream gradient was approximately 12% through a steep "V" shaped canyon. The riparian corridor consists of dense coniferous and deciduous trees and brush with nearly 100% canopy cover over the stream channel. Substrate within the stream channel consists of 30% cobble, 50% rubble, and 20% boulder. Abundant fallen timber and other woody debris lie in the stream channel. The overall character of Tarlac Creek from the mouth upstream is high gradient with a riffle - drop complex with many pocket water areas.

Uleada Creek, another tributary to the Middle Fork East River, runs its course through a "V" shaped valley. Discharge at the time of survey was approximately 5 cfs with a midday temperature of 9°C. The surveyed reach of Uleada Creek is located 2 km upstream from the mouth. Very similar in nature to Tarlac Creek, the riparian corridor of Uleada Creek is densely vegetated with deciduous brush and coniferous trees, western red cedar is the dominant conifer. Gradient in the survey reach was measured at 15%. The substrate consists of 30% cobble, 50% rubble and 20% boulder. The overall character of Uleada Creek from the mouth upstream is high gradient with a riffle - drop complex and many small pocket water areas. Fallen timber and other woody debris are found throughout the stream course.

No fisheries information was gathered in 1995 due to problems with the backpack electrofisher. The nature of the stream course in both Tarlac and Uleada creeks is such that snorkeling would not provide a good density estimate. Electrofishing of all three streams is scheduled for 1996.

Kootenai River Kokanee Spawning Ground Counts

Early spawning kokanee from Kootenay Lake, British Columbia, Canada, utilize tributaries of the Kootenai River in Idaho for spawning. The Kootenay Lake South Arm stocks have been declining for many years (Horner et al. 1996a). Estimates of the number of spawning kokanee in four Kootenai River

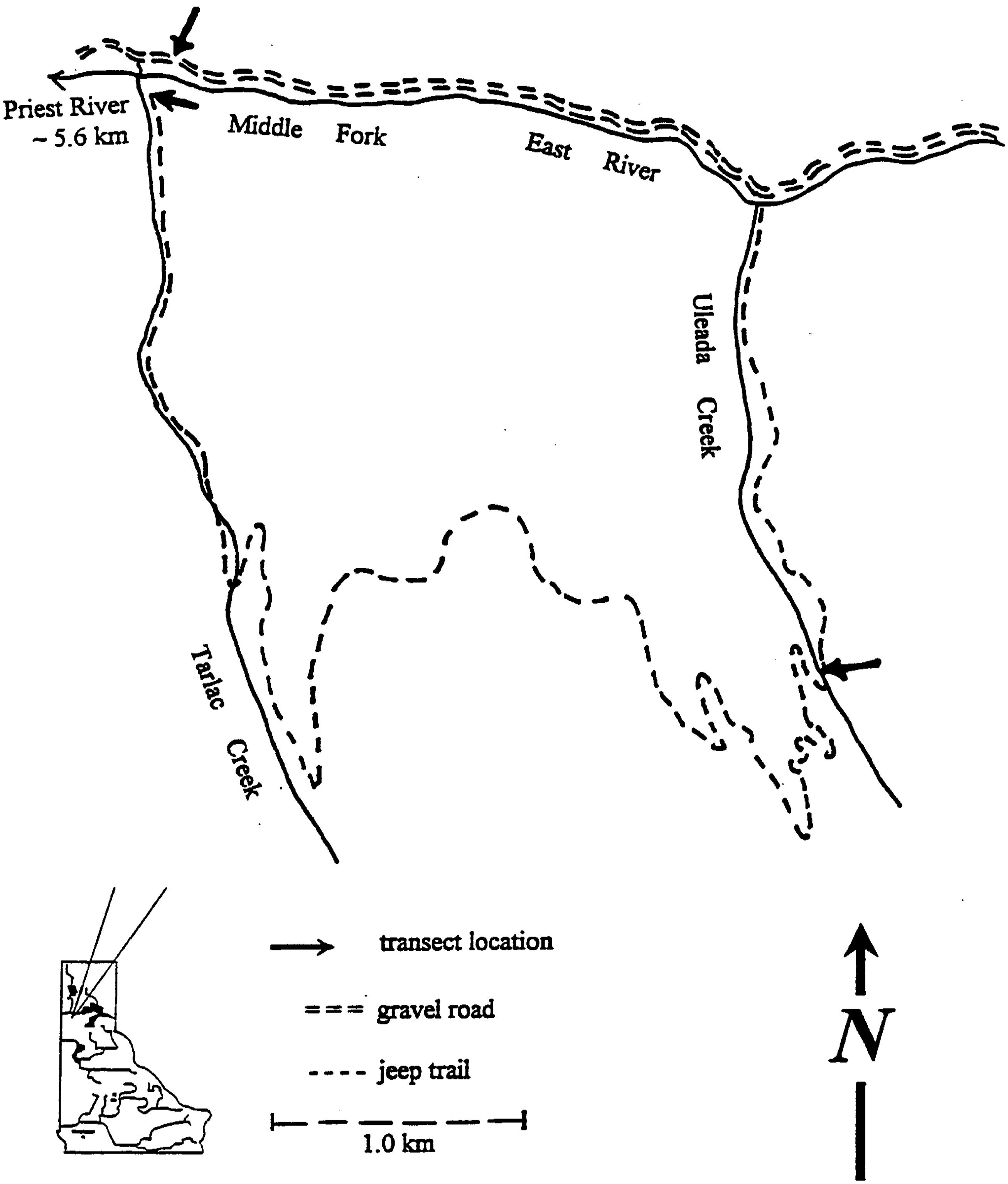

Figure 6. Map of Middle Fork East River, Tarlac, and Uleada creeks, Priest River drainage, Idaho, with 1995 stream survey transect locations.

tributaries have been made during a one-day count in mid-August to early September since 1983. The 1995 spawning escapement counts are reported in Table 8, along with previous years estimates.

Officer Creel Census of Panhandle Region Rivers and Streams

In 1995 impromptu creel census efforts by regional officers reported angler effort and catch on 30 stream systems in the Panhandle Region (Appendix G). These angler contacts were not part of any structured creel census, but were associated with license checks and regulation enforcement. A total of 384 anglers were interviewed. Effort and catch are presented in Appendix G.

RECOMMENDATIONS

1. Conduct biennial snorkeling surveys in the LNFCDAR, NFCDAR, and SJR.

2. Conduct biennial electrofishing population estimates in the LNFCDAR, NFCDAR, and the SJR to correspond with snorkeling surveys.

3. Survey all 17 bull trout spawning streams in the Pend Oreille drainage in 1995.

4. Monitor bull trout abundance through redd counts in five index streams in the SJR to establish a long-term trend in abundance.

5. Continue bull trout redd surveys in the Upper Priest Lake and SJR drainages.

6. Continue with increased enforcement efforts in the tributary streams during late summer and early fall when adult bull trout are vulnerable to illegal harvest.

7. Post bull trout identification and regulation signs showing harvest closures and bag limits where appropriate.

8. Actively oppose any land use activities that could detrimentally affect bull trout habitat and support activities that protect or recover critical habitats.

9. Electrofish Middle Fork East River, Tarlac, and Uleada creeks in 1996 to obtain fish species diversity and fish density estimates.

Table 8. Number of spawning kokanee salmon counted in tributaries to the Kootenai River, Idaho, 1983-1995.

Stream	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
Boundary	10	55	200	10	0	0	30	4	1	10	10	6	1
Long Canyon	300	17	650	400	0	0	0	0	0	0	0	0	24
Parker	100	70	75	10	6	0	0	0	0	0	4	6	17
Smith	150	130	1500	400	350	200+	75	40	10	75+	15	50+	0

1983 counts made on August 15.
1984 and 1991 counts made on August 31.
1985 counts made on September 6.
1986 counts made on September 4.
1987-1990 and 1993 counts made on September 1.
1992 counts made on August 30.
1994 counts made on September 1.
1995 counts made between August 1 and September 26.

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APPENDICES

Appendix A. Summary of snorkeling observations in transects in the North Fork Coeur d'Alene River, Idaho, August 1995.

Transect Number	River Section	Length (m)	Width (m)	Area (m2)	Number of Fish Observed: Cutthroat ≤300 (mm)	Cutthroat >300 (mm)	Wild rainbow ≤300 (mm)	Wild rainbow >300 (mm)	Hatchery rainbow	Whitefish[a]	Other[b]
1	4	40	16.8	672.0	3	0	0	0	0	0	0
2	4	110	15.2	1672.0	0	0	0	0	0	0	0
3	4	82	14.8	1213.6	0	0	0	0	0	0	0
4	4	155	17.5	2712.5	0	7	0	0	0	0	0
5	4	189	11.7	2211.3	0	1	0	0	0	0	0
6	3	95	18.3	1738.5	15	2	0	0	0	50	0
7	3	63	11.4	718.2	1	0	0	0	0	0	0
8	3	95	13.8	1311.0	1	1	0	0	0	1	0
9	3	95	22.2	2109.0	58	2	0	0	0	50	0
10	3	180	21.7	3906.0	72	2	2	0	0	60	0
11	2	60	26.0	1560.0	10	1	2	0	0	5	0
12	2	120	18.9	2268.0	2	0	0	0	0	0	0
13	2	315	27.8	8757.0	3	0	0	0	0	0	0
14	2	200	19.7	3940.0	5	1	7	0	18	0	1
15	2	185	32.5	6013.0	20	1	5	0	0	20	0
16	1	104	38.8	4035.0	20	1	13	1	0	18	0
17	1	140	30.3	4242.0	65	1	23	2	0	100	0
18	1	165	35.0	5775.0	18	0	21	0	0	78	0

Appendix A. Continued.

					Number of Fish Observed						
					Cutthroat		Wild rainbow		Hatchery rainbow	Whitefish[a]	Other[b]
Transect Number	River Section	Length (m)	Width (m)	Area (m2)	≤300 (mm)	>300 (mm)	≤300 (mm)	>300 (mm)			
19	1	190	27.5	5225.0	0	0	23	4	0	20	0
20	1	115	38.0	4370.0	0	0	27	2	4	53	40
21	1	170	33.0	7055.0	30	0	40	0	0	200	0
22	1	11	37.0	407.0	25	1	40	1	3	300	12
23	1	180	35.0	6300.0	30	0	40	1	0	250	0
34	5	120	11.5	1380.0	1	0	0	0	0	0	0
35	5	47	12.4	582.8	0	1	0	0	0	0	0
36	5	35	19.7	689.5	0	0	0	0	0	0	0
37	5	60	8.2	492.0	0	1	0	0	0	100	20
38	5	72	11.6	835.2	6	10	0	0	0	0	0

[a] Whitefish includes adults and juveniles
[b] Other includes squawfish and suckers

Appendix B. Densities of fish observed while snorkeling in transects in the North Fork Coeur d'Alene River, Idaho, August 1995.

Transect Number	River Section	Length (m)	Width (m)	Area (m^2)	Cutthroat No./m^2	Cutthroat No./100m^2	Wild rainbow No./m^2	Wild rainbow No./100m^2	Hatchery rainbow No./m^2	Hatchery rainbow No./100m^2
1	4	40	16.8	672.0	0.004	0.4	0	0	0	0
2	4	110	15.2	1672.0	0	0	0	0	0	0
3	4	82	14.8	1213.6	0	0	0	0	0	0
4	4	155	17.5	2712.5	0	0	0	0	0	0
5	4	189	11.7	2211.3	0	0	0	0	0	0
6	3	95	18.3	1738.5	0.009	0.9	0	0	0	0
7	3	63	11.4	718.2	0.001	0.1	0	0	0	0
8	3	95	13.8	1311.0	0.0007	0.08	0	0	0	0
9	3	95	22.2	2109.0	0.028	2.8	0	0	0	0
10	3	180	21.7	3906.0	0.018	1.8	0.001	0.1	0	0
11	2	60	26.0	1560.0	0.006	0.6	0.001	0.1	0	0
12	2	120	18.9	2268.0	0.0009	0.09	0	0	0	0
13	2	315	27.8	8757.0	0.0003	0.03	0	0	0	0
14	2	200	19.7	3940.0	0.001	0.1	0.002	0.2	0.005	0.5
15	2	185	32.5	6013.0	0.003	0.3	0.001	0.1	0	0
16	1	104	38.8	4035.0	0.005	0.5	0.003	0.3	0	0
17	1	140	30.3	4242.0	0.015	1.5	0.005	0.5	0.0009	0.09
18	1	165	35.0	5775.0	0.003	0.3	0.004	0.4	0	0
19	1	190	27.5	5225.0	0	0	0.004	0.4	0	0

Appendix B. Continued.

Transect Number	River Section	Length (m)	Width (m)	Area (m^2)	Density of Fish Observed: Cutthroat No./m^2	Cutthroat No./100m^2	Wild rainbow No./m^2	Wild rainbow No./100m^2	Hatchery rainbow No./m^2	Hatchery rainbow No./100m^2
20	1	115	38.0	4370.0	0	0	0.006	0.6	0.0009	0.09
21	1	170	41.5	7055.0	0.005	0.5	0.007	0.7	0	0
22	1	11	40.0	440.0	0.061	6.1	0.098	9.8	0.007	0.7
23	1	180	28.4	5112.0	0.005	0.5	0.006	0.6	0	0
34	5	120	15.1	1812.0	0.0007	0.07	0	0	0	0
35	5	47	8.9	418.3	0	0	0	0	0	0
36	5	35	17.1	598.5	0	0	0	0	0	0
37	5	60	15.3	918.0	0	0	0	0	0	0
38	5	72	11.6	835.2	0.007	0.7	0	0	0	0

Appendix C. Number and estimated densities of fish observed in snorkeling transects in the Little North Fork Coeur d'Alene River, Idaho, August 1995.

New trans. number	Old trans. number	River section	Length (m)	Width (m)	Area (m^2)	Cutthroat <300	Cutthroat >300	Wild rainbow ≤300	Wild rainbow >300	Hatchery rainbow	Whitefish[a]	Other[b]	Cutthroat No./m^2	Cutthroat No. /100m^2	Wild rainbow No./m^2	Wild rainbow No. /100m^2	Hatchery rainbow No./m^2	Hatchery rainbow No. /100m^2
1	33	7	75	21.8	1,575.0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	32	7	140	17.0	2,380.0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	31	7	235	17.0	3,995.0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	30	7	23	14.0	322.0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	29	7	82	16.0	1,312.0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	28	7	100	15.1	1,510.0	6	0	6	0	0	0	0	0.004	0.4	0	0	0	0
7	27	7	55	15.1	830.5	0	0	0	0	0	0	0	0	0	0	0	0	0
8	26	7	100	15.8	1,580.0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	25	8	50	15.6	780.0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	24	8	88	15.0	1,320.0	8	0	0	0	0	0	0	0	0	0	0	0	0
11	101	8	55	15.6	885.0	2	0	0	0	0	0	0	0.002	0.2	0	0	0	0
12	102	8	72	10.0	720.0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	104	8	64	12.9	819.2	0	0	0	0	0	0	0	0	0	0	0	0	0

[a] Whitefish includes adults and juveniles.
[b] Other includes squawfish and suckers.

Appendix D. Summary of snorkeling observations in transects in the St. Joe River, Idaho, August 1995.

					Number of fish observed								
					Cutthroat		Bull trout		Wild rainbow		Hatchery rainbow	Whitefish[a]	Other[b]
Transect Number	River Section	Length (m)	Width (m)	Area (m^2)	≤300 (mm)	>300 (mm)	≤300 (mm)	>300 (mm)	≤300 (mm)	>300 (mm)			
1	c&k	85	34.2	2,907	2	0	0	0	0	0	0	12	0
2	c&k	89	30.2	2,688	52	4	1	1	0	0	0	150	40
3	c&k	85	11.8	1,003	13	2	0	1	0	0	1	8	0
4	c&k	68	13.2	898	23	1	0	0	0	0	1	10	0
5	c&k	90	22.0	1,980	25	0	0	0	1	0	0	15	10
6	c&k	155	29.3	4,542	7	2	0	0	0	0	7	17	0
7	c&k	90	28.0	2,520	0	0	0	0	0	0	1	2	0
8	c&r	143	21.2	3,032	35	8	0	0	3	0	0	43	37
9	c&r	125	19.8	2,475	49	6	0	0	0	0	0	25	12
10	c&r	193	17.7	3,416	38	6	0	0	1	0	0	50	35
11	c&r	82	18.8	1,542	15	0	0	0	0	0	0	0	0
12	c&r	55	24.9	1,370	69	11	0	0	0	0	1	30	16
13	c&r	95	29.5	2,803	64	18	0	0	0	0	0	55	35
14	c&r	90	18.2	1,629	47	13	0	0	0	0	0	12	3
15	c&r	79	14.1	1,107	32	8	0	0	0	0	0	25	7
16	c&r	91	14.7	1,330	8	0	0	0	0	0	0	0	1
17	c&r	122	15.0	1,830	18	0	0	0	0	0	0	12	0
18	c&r	96	13.7	1,315	46	5	0	0	0	0	0	30	10
19	c&r	121	14.7	1,779	24	5	0	0	0	0	0	0	9
20	c&r	70	22.2	1,554	56	7	0	0	0	0	0	60	0

Appendix D. Continued.

Transect Number	River Section	Length (m)	Width (m)	Area (m^2)	Cutthroat ≤300 (mm)	Cutthroat >300 (mm)	Bull trout ≤300 (mm)	Bull trout >300 (mm)	Wild rainbow ≤300 (mm)	Wild rainbow >300 (mm)	Hatchery rainbow	Whitefish[a]	Other[b]
21	c&r	43	21.2	912	37	7	0	0	0	0	0	36	12
22	c&r	58	22.5	1,305	55	15	0	0	0	0	0	80	12
23	c&r	50	20.8	1000	17	5	0	0	0	0	0	0	0
24	c&r	88	19.0	1,672	23	6	0	0	0	0	0	30	0
25	c&r	50	17.0	850	22	5	0	0	0	0	0	12	0
26	c&r	80	20.6	1,648	17	15	0	0	0	0	0	12	1
27	c&r	46	20.1	925	43	14	0	0	1	0	0	60	6
28	c&r	40	15.6	616	4	2	0	0	0	0	0	2	0
29	c&k	180	38.0	6,840	0	0	0	0	0	0	7	0	100
30	c&k	230	40.0	9,200	0	0	0	0	0	0	36	0	112
31	c&k	200	40.0	8,000	17	0	0	0	0	0	15	20	25
32	c&k	64	45.8	2,917	12	1	0	0	0	0	4	0	136
33	c&k	150	47.5	7,125	0	0	0	0	0	0	0	0	0
34	c&k	86	30.0	2,580	27	6	0	0	0	0	0	100	12
35	c&k	75	36.4	2,730	0	0	0	0	0	0	20	15	1

Number of fish observed: columns Cutthroat through Other.

[a] Whitefish includes the number of juveniles and adults.
[b] Includes squawfish and suckers.

Appendix E. Densities for fish observed while snorkeling in transects in the St. Joe River, Idaho, August 1995.

Transect Number	Densities of fish observed									
	Cutthroat		Bull trout		Wild rainbow		Hatchery rainbow		Total salmonids	
	No./m^2	No./100 m^2	No./m^2	No./100 m^2	No./m^2	No./100 m^2	No./m^2	No./100 m^2	No./m^2	No./100 m^2
1	0.0007	0.07	0	0	0	0	0	0	0.001	0.07
2	0.02	2.1	0.0007	0.07	0	0	0	0	0.022	2.17
3	0.015	1.5	0.001	0.1	0	0	0.001	0.1	0.016	1.6
4	0.027	2.67	0	0	0	0	0.001	0.1	0.027	2.67
5	0.013	1.3	0	0	0.0005	0.05	0	0	0.013	1.3
6	0.002	0.2	0	0	0	0	0.002	0.15	0.002	0.2
7	0	0	0	0	0	0	0.0004	0.04	0.0004	0.04
8	0.015	1.5	0	0	0.001	0.1	0	0	0.016	1.6
9	0.02	2.2	0	0	0	0	0	0	0.022	2.2
10	0.01	1.3	0	0	0.0003	0.03	0	0	0.010	1.03
11	0.01	1.0	0	0	0	0	0	0	0.01	1.0
12	0.06	5.8	0	0	0	0	0.001	0.1	0.051	5.1
13	0.02	2.3	0	0	0	0	0	0	0.023	2.3
14	0.037	3.68	0	0	0	0	0	0	0.037	3.68
15	0.036	3.61	0	0	0	0	0	0	0.036	3.61
16	0.006	0.6	0	0	0	0	0	0	0.006	0.6
17	0.01	0.98	0	0	0	0	0	0	0.01	0.98
18	0.039	3.88	0	0	0	0	0	0	0.039	3.88
19	0.016	1.63	0	0	0	0	0	0	0.016	1.63
20	0.04	4.0	0	0	0	0	0	0	0.04	4.00
21	0.03	2.96	0	0	0	0	0	0	0.03	2.96

	Densities of fish observed									
	Cutthroat		Bull trout		Wild rainbow		Hatchery rainbow		Total salmonids	
	No./m2	Transect Number	No./m²	No./100 m²	No./m²	No./100 m²	No./m²	No./100m²	No./m²	No./100 m²
22	0.05	5.36	0	0	0	0	0	0	0.053	5.36
23	0.022	2.2	0	0	0	0	0	0	0.022	2.2
24	0.017	1.7	0	0	0	0	0	0	0.017	1.7
25	0.032	3.2	0	0	0	0	0	0	0.032	3.2
26	0.019	1.9	0	0	0	0	0	0	0.019	1.9
27	0.063	6.27	0	0	0	0	0	0	0.063	6.27
28	0.01	0.97	0.001	0.11	0	0	0	0	0.011	1.1
29	0	0	0	0	0	0	0.001	0.1	0.001	0.1
30	0	0	0	0	0	0	0.004	0.39	0.004	0.39
31	0.002	0.2	0	0	0	0	0.002	0.19	0.004	0.39
32	0.004	0.446	0	0	0	0	0.001	0.1	0.006	0.67
33	0	0	0	0	0	0	0	0	0	0
34	0.013	1.28	0	0	0	0	0	0	0.003	0.28
35	0	0	0	0	0	0	0.007	0.73	0.007	0.73

Appendix F. Distribution and density of bull trout and habitat classification in the Little North Fork of the Clearwater River, Lund, Little Lost Lake, and Lost Lake creeks, Idaho, 1995.

by

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Panhandle Region
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Coeur d'Alene District

December 1995

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ABSTRACT

A total of thirteen bull trout, three juveniles and 10 adults (including two natural mortalities, possibly predator related) were observed during the study. Only two juveniles were observed in snorkeling transects. Pool habitat comprised 16%, 14%, 18%, and 21% of the total surveyed length in Lund, Little Lost Lake, Lost Lake creeks, and Little North Fork Clearwater River, respectively. Riffle habitat comprised 75.8%, 79.7%, 73.0%, and 73.8% of the total surveyed length in Lund, Little Lost Lake, Lost Lake creeks and Little North Fork Clearwater River, respectively. The juveniles were located in pools that contained woody debris in and over the pool. Adult bull trout were observed in pools with woody debris and in high gradient riffles with boulders to break the momentum of the flow.

INTRODUCTION

This was a cooperative effort of the Idaho Department of Fish and Game, Panhandle Region and the United States Department of Interior, Bureau of Land Management, Coeur d'Alene District. The goals of the study were to determine the distribution and density of juvenile and adult bull trout (Salvelinus confluentus) and classify stream habitats within the upper Little North Fork Clearwater River and three tributaries, Lund, Little Lost Lake, and Lost Lake creeks.

STUDY AREA

The study area is located in the St. Joe National Forest (Panhandle National Forests), on public lands administered primarily by the Bureau of Land Management (BLM) and partially by the United States Forest Service. The study area may be found on the Widow Mountain 7.5 minute quadrangle T 46 N, R 4 E, Sections 1, 2, 3, 10, 11, 12, 14, 15, 18, 19, 24, and 26 (Figure 1).

The stream section on the Little North Fork Clearwater River started at the Forest Service Road 760 bridge and extended upstream a minimum of 3,000 m. Each of the study areas on the tributaries began at the confluence with the Little North Fork Clearwater River and extended a minimum of 3,000 m upstream.

METHODS

A stream habitat was classified into one of six categories, pools (PLS), high gradient riffles (HGR), low gradient riffles (LGR), runs (RUNS), cascades (CSC), and pocket water (POW). A hip chain was used to measure the length of each habitat type. Mean width and depth were calculated for each habitat type. Maximum pool crest depth and maximum pool depth were measured at each pool. Stream gradient was determined using a hand held level and a stadia rod. Stream substrate was evaluated for composition and quantity

Five snorkeling transects were located in each stream section to determine presence and density of bull trout. The area of each transect was calculated. Transects were snorkeled between the hours of 1400 and 1900. All bull trout observed while snorkeling or during the habitat surveys were recorded.

RESULTS

The percentage of pool habitat in the total length of surveyed stream sections was 16%, 14%, 18%, and 21% in Lund, Little Lost Lake, Lost Lake creeks and Little North Fork Clearwater River, respectively (Table 1). The percentage of low gradient riffles differed in each stream with a low of 18% in Lund Creek and a high of 61% found in Little Lost Lake Creek (Table 1). High gradient riffles were found in an inverse correlation to low gradient riffles, a high in Lund Creek of 58% and a low of 16% in Lost Lake Creek (Table 1). The percentages of cascades, run and pocket water ranged zero to 5% (Table 1).

There were thirteen bull trout observed in the entire study area, including two natural mortalities that may have been caused by an animal predator. Only three juvenile bull trout and two adult bull trout were observed while snorkeling. Lund Creek had the highest number of bull trout with six, including the two mortalities. Five bull trout were observed in Lost Lake Creek. Two bull trout were observed in Little Lost Lake Creek. No bull trout were observed in the Little North Fork Clearwater River (Table 2). Lost Lake Creek had the highest density of bull trout observed in snorkeling transects, 0.007 fish\m^2 (Table 3).

Woody debris, essential to bull trout abundance, was observed in all of the tributaries. Lund Creek contained the lowest quantity of woody debris with 8% of the pools containing woody debris. Twenty-eight percent of the pools in the Little Lost Lake Creek contained woody debris. Thirty five percent of the pools in Lost Lake Creek contained woody debris, and 66 m of the stream was covered with woody debris so dense that habitat identification was prevented. Woody debris was observed in 58% of the pools in the Little North Fork Clearwater River.

Water temperature is an important key to bull trout spawning behavior. Water temperatures in tributaries below 10 C are needed for spawning (Bjornn 1991). Water temperatures in the study area tributaries ranged 6 to 9 C in August (Table 5).

Two potential barriers to spawning were identified. The first was located in Lund Creek approximately 2670 m upstream from the confluence with the Little North Fork Clearwater River. This barrier consisted of a waterfall 3.2 m high. This barrier has geological significance. The second barrier was located 1633 m upstream in Lost Lake Creek. It consisted of an LGR composed of road ballast created from the removal of a bridge. High water may allow passage over this barrier but high flows are uncommon during the time of year bull trout are migrating to spawning sites.

Suitable spawning habitat was observed in all surveyed sections. Spawning habitat consisted of gravel and rubble. Little Lost Lake Creek had the highest amount of spawning habitat and Lund Creek had the lowest amount of spawning habitat (Table 4).

DISCUSSION

There were 13 bull trout observed in the study area. Three were juvenile bull trout, and two of these were observed while snorkeling (Table 2). The juveniles were located in pools that contained woody debris in and over the pool. Adult bull trout were observed in pools with woody debris and in high gradient riffles with boulders to break the momentum of the flow probably en route to spawning areas.

The low number of bull trout observed might be related to habitat. Bull trout mature and return to their natal stream to spawn between the ages of four and ten years (Bjornn 1991). Juvenile bull trout may remain one to four years in their natal stream before dropping down into a larger waterway or lake during the spring or summer. There appeared to be adequate spawning habitat in all the stream sections surveyed. Bull trout also need rearing habitat as well as spawning habitat to be successful in a stream. The best rearing habitat for bull trout included pools with woody debris and cold water temperatures. Most of the bull trout observed in the study area were in association with woody debris. Some woody debris was found in all streams surveyed, however, woody debris was generally not abundant. The low amount of rearing habitat in the tributaries may force juvenile bull trout downstream into a larger body of water to find suitable rearing habitat.

The low number of juvenile and adult bull trout observed during daytime snorkeling may also be a result of an inefficient survey method for bull trout and may not be an indicator of a weak population. Electrofishing and nighttime snorkeling have been shown to be more effective survey methods than daytime snorkeling (Goetz 1990, Schill 1991). Unfortunately, the limited funding and logistical constraints of surveying streams in this area did not allow for a comparison of day and night snorkeling or electrofishing.

MANAGEMENT IMPLICATIONS

The presence of both juvenile and adult bull trout does indicate a reproducing population is present. Land management activities within the watershed of the surveyed areas should be designed to minimize any damage to the existing stream habitat. The existing stream habitat could be improved. The bull trout population in Lund, Little Lost Lake, and Lost Lake creeks and the Little North Fork Clearwater River would benefit from the addition of woody debris. A very small percentage of surveyed stream habitat contained woody debris. In streams with higher numbers of bull trout, woody debris is very abundant. However, a more intensive survey would be required to better define bull trout population status and habitat limiting factors.

Table 1. Summary of length, width, and depth of habitat types in Little North Fork Clearwater River, Lund Cr., Little Lost Lake Cr., and Lost Lake Cr., Idaho, August 1995.

	Lund Cr.	Little Lost Lake Cr.	Lost Lake Cr.	Little North Fork Clearwater River
Survey reach length (m)	3012	3561	3780	3344
Number of pools	65	88	109	84
Width range (m)	3.1-10	1.5-6.5	0.8-7.2	2.2-7.5
Depth range (m)	0.35-1.66	0.22-0.92	0.26-1.18	0.28-1.0
Length range (m)	4.0-12.0	3.0-12.0	1.0-20.0	4.0-18.0
Total length (m)	485	510	682	717
% of total	16	14	18	21
Number of low gradient riffles	38	88	91	59
Width range (m)	3.0-12.0	2.0-7.0	1.5-8.5	3.0-8.0
Depth range (m)	0.24-0.68	0.15-0.51	0.15-0.55	0.18-0.60
Length range (m)	2.7-40.0	2.0-135.0	2.0-109.0	2.0-54.0
Total length (m)	550	2183	2146	1302
% of total	18	61	59	39
Number of high gradient riffles	70	28	29	55
Width range (m)	4.5-14.2	2.5-6.3	1.5-6.4	2.0-7.0
Depth range (m)	0.3-0.7	0.22-0.56	0.21-0.7	0.17-0.6
Length range (m)	2.4-81.0	4.0-74.0	2.0-85.0	4.0-75.0
Total length (m)	1733	654	614	1166
% of total	58	18	16	39
Number of runs	3	8	6	11
Width range (m)	3.6-5.7	3.0-7.0	3.4-6.2	3.7-7.5

Table 1. Continued

Depth range (m)	0.4-0.64	0.28-0.65	0.35-0.6	0.35-0.6
Length range (m)	8.8-12.0	3.0-14.0	2.0-19.0	2.0-22.0
Total length (m)	32	65	53	117
% of total	1	2	1	4
Number of cascades	13	4	5	0
Width range (m)	3.0-20.0	4.5-11.0	1.5-3.9	0
Depth range (m)	0.32-0.82	0.15-0.35	0.2-0.9	0
Length range (m)	2.0-12.0	3.0-11.0	4.0-12.0	0
Total length (m)	73	28	83	0
% of total	2	1	2	0
Number of pocket waters	12	25	25	12
Depth range (m)	0.38-0.7	0.22-0.82	0.28-0.78	0.25-0.78
Length range (m)	4.0-29.2	1.0-19.0	1.0-20.0	2.0-6.0
Total length (m)	139	121	133	42
% of total	5	3	4	1
Gradient (%)	5.7	5.0	2.3	2.7
Stream type[1]	A	A	B4	B3

1. Classifications are based on Rosgen (1985).

Table 2. Number of bull trout observed during snorkeling and habitat surveys in Lund Cr., Little Lost Lake Cr., Lost Lake Cr., and Little North Fork Clearwater River, Idaho, August 1995.

	Lund Cr.	Little Lost Lake Cr.	Lost Lake Cr.	Little North Fork Clearwater River
Snorkel transects	2 (adult mortalities)	1 juvenile	1 juvenile 2 adults	0
Habitat survey	1 juvenile 3 adults	1 adult	2 adults	0
Total adults	5	1	4	0
Total juveniles	1	1	1	0
Total bull trout	6	2	5	0

Table 3. Densities of bull trout observed in snorkeling transects in Lund Cr., Little Lost Lake Cr., Lost lake Cr., and Little North Fork Clearwater River, Idaho, August 1995.

Transect number	Length (m)	Width (m)	Area (m^2)	Bull trout observed	Bull trout\ m^2	Bull trout\ 100 m^2
Lund Cr.						
1	89	5.4	481	2 mort.	0	0
2	98	6.1	598	0	0	0
3	83	5.7	473	0	0	0
4	88	6.7	590	0	0	0
5	89	5.6	498	0	0	0
Little Lost Lake Cr.						
1	64	3.7	237	0	0	0
2	123	5.4	664	0	0	0
3	113	4.4	497	1 juv	0.002	.0201
4	112	4.1	459	0	0	0
5	80	4.6	368	0	0	0
Lost Lake Cr.						
1	71	5.3	376	0	0	0
2	115	4.7	541	0	0	0
3	93	4.6	428	0	0	0
4	93	4.5	419	1 juv.	0.0024	0.24
5	95	3.9	371	2 adults	0.0054	0.54

Table 3. Continued

Little North Fork Clearwater						
1	118	5.4	637	0	0	0
2	94	5.3	498	0	0	0
3	101	5.6	566	0	0	0
4	105	4.4	462	0	0	0
5	93	4.3	400	0	0	0

Table 4. Percentage of substrate composition, Lund Cr., Little Lost Lake Cr., Lost Lake Cr., and Little North Fork Clearwater River, Idaho, August 1995.

	Lund Cr.	Little Lost Lake Cr.	Lost Lake Cr.	Little North Fork Clearwater River
Silt/sand	2.6	9.6	13.7	12.5
Gravel	9.4	26.8	32.9	19.7
Rubble	12.5	41.1	24.2	21.6
Cobble	20.7	16.7	17.8	30.7
Boulder	44.7	5.8	11.3	15.6
Bedrock	10.1	0	0	0

Table 5. Percentage of habitat types in Lund Cr., Little Lost Lake Cr., Lost Lake Cr., and Little North Fork Clearwater River, Idaho, August 1995.

Habitat type	Lund Cr.	Little Lost Lake Cr.	Lost Lake Cr.	Little North Fork Clearwater River
Pools	16.1	14.3	18.0	21.4
Pools with woody debris	8.0	28.0	35.0	58.0
Runs	1.0	1.8	1.4	3.5
Low gradient riffles	18.3	61.3	56.8	38.9
High gradient riffles	57.5	18.4	16.2	34.9
Cascades	2.4	0.8	2.2	0
Pocket waters	4.6	3.4	3.5	1.3
Water temperature C	7	6	8	9

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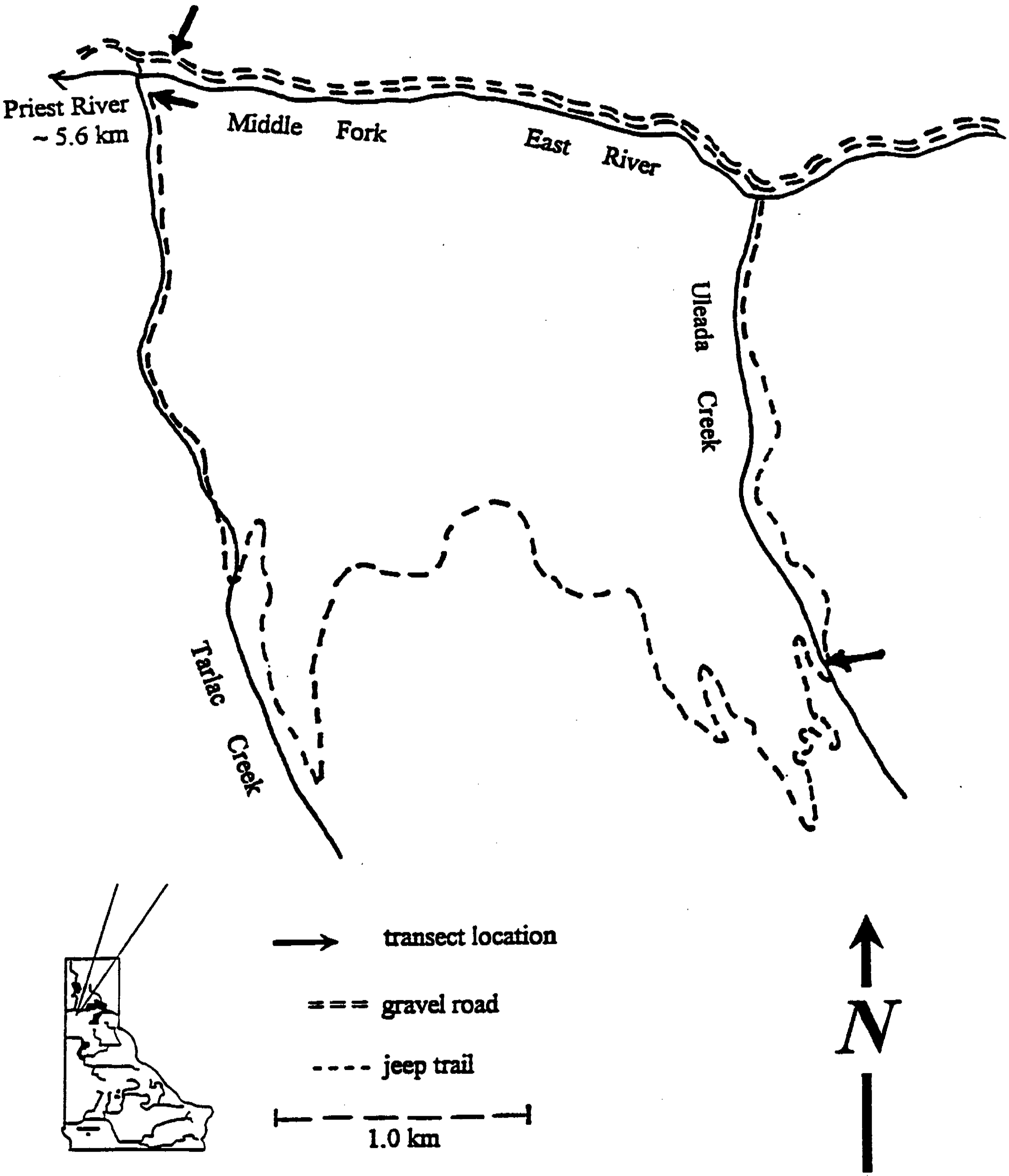
Schill, D. 1991. Job performance report. Project F-73-R-13. Rivers and streams investigations. Federal Aid in Fish Restoration. Idaho Department of Fish and Game, Boise.

Appendix G. Standard stream survey physical habitat data for the Middle Fork East River, Tarlac, and Uleada creeks, Priest River drainage, Idaho.

Map of Middle Fork East River, Tarlac and Uleada creeks, Priest River drainage, Idaho, with 1995 stream survey transect locations.



IDAHO DEPARTMENT OF FISH AND GAME
STANDARD STREAM SURVEYS

FISH SURVEY DATA

Stream M.F E. River Date 8/2/95 Survey Crew Nelson, Gilliland

Agency: Idaho Department of Fish and Game

IDFG Region: (circle your region) R-1 R-2, R-3, R-M, R-4, R-5, R-6, R-7

Stratum ______ Transect At mouth of Tarlac Cr.

Channel Type: B, C, Other

Section Type: monitoring, chinook sup., steelhead sup., evaluation

Quad Map USGS

UTM x/y N48°22'.235 W116°42.289

EPA Reach # ______

Length 100m Transect Widths ______

H_2O Temp. 11° Time 2:00pm Mean Width 25'

Conductivity ______ μS Transect Area ______

Corridor visibility ______ m

Methods: ( ) Snorkel (circle corridor or entire stream width)
( ) Electrofish
( ) Other ______

Habitat Type: (circle one) Pool, Riffle, Run/glide, Pocket Water

STREAM M.F. E. River DATE 8/2/95 COLLECTORS Nelson, Gilliland

EPA REACH ______ LENGTH 100' STRATUM ______

TRANSECT At mouth of tarlac GRADIENT %/VERTICAL DROP 2%

CHANNEL TYPES: B - confined, flushing
C - meandered, depositional

PERCENT HABITAT TYPE: Pool ______ Riffle 60 Run/Glide 20 Pocket Water 20

COMMENTS (about anything instructive...vegetative cover, bank stability, etc.) abundant Riparian vegetation mixed with deciduous brush and coniferous trees, especially W. Red Cedar.

Transect Length from Bottom	Width $\bar{X}$	Location on transect (l to r)	Depth $\bar{X}$	Velocity (run only)	Percent Substrate Class by Area				
					Sand	Gravel	Rubble/Cobble	Boulder	Bedrock
100'	25'	1/4	1'	53.5 cfs			50/30	20	
		1/2							
		3/4							
		1/4							
		1/2							
		3/4							
		1/4							
		1/2							
		3/4							
		1/4							
		1/2							
		3/4							

IDAHO DEPARTMENT OF FISH AND GAME
STANDARD STREAM SURVEYS

FISH SURVEY DATA

Stream Tarlac Cr. Date 8/2/95 Survey Crew Nelson, Gilliland

Agency: Idaho Department of Fish and Game

IDFG Region: (circle your region) R-1, R-2, R-3, R-M, R-4, R-5, R-6, R-7

Stratum ____________ Transect ____________

Channel Type: B, C, Other

Section Type: monitoring, chinook sup., steelhead sup., evaluation

Quad Map USGS

UTM x/y N48°22.235' W116°42.289'

EPA Reach # ____________

Length 100'

Transect Widths ____________

H_2O Temp. 10° Time 1:30 pm Mean Width 9'

Conductivity ______ µS Transect Area ____________

Corridor visibility ______ m

Methods: ( ) Snorkel (circle corridor or entire stream width)
( ) Electrofish
( ) Other ____________

Habitat Type: (circle one) Pool, Riffle, Run/glide, Pocket Water

The mouth of Tarlac Cr. is located around the 5.5 mile marker coming up the M.F. East R. road. Narrow turn-off is located on right hand side.

STREAM Tarlac Cr. DATE 8-2-95 COLLECTORS Lance Nelson, Mark Gilliland

EPA REACH ____ LENGTH 100' STRATUM ____

TRANSECT ____ GRADIENT %/VERTICAL DROP 12%

CHANNEL TYPES: B - confined, flushing
C - meandered, depositional

PERCENT HABITAT TYPE: Pool ____ Riffle 80 Run/Glide ____ Pocket Water 20

COMMENTS (about anything instructive...vegetative cover, bank stability, etc.) Dense vegetative cover - coniferous trees, deciduous brush. Cover nearly closes canopy above stream. Alot of shade covers stream channel. A lot of fallen timber is located throughout channel.

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Transect Length from Bottom	Width $\bar{X}$	Location on transect (l to r)	Depth $\bar{X}$	Velocity (run only)	Percent Substrate Class by Area				
					Sand	Gravel	Rubble Cobble	Boulder	Bedrock
100'	9'	1/4	.75'	1.7 cfs			50/30	20	
		1/2							
		3/4							
		1/4							
		1/2							
		3/4							
		1/4							
		1/2							
		3/4							
		1/4							
		1/2							
		3/4							

IDAHO DEPARTMENT OF FISH AND GAME
STANDARD STREAM SURVEYS

FISH SURVEY DATA

Stream Uleda Cr. Date 8/2/95 Survey Crew Nelson, Gilliland

Agency: Idaho Department of Fish and Game

IDFG Region: (circle your region) R-1, R-2, R-3, R-M, R-4, R-5, R-6, R-7

Stratum ______ Transect ______

Channel Type: B, C, Other

Section Type: monitoring, chinook sup., steelhead sup., evaluation

Quad Map USGS

UTM x/y N48°22.222' W116°42.311'

EPA Reach # ______

Length 100'

Transect Widths ______

H_2O Temp. 9°C Time 12:00pm Mean Width 15'

Conductivity ______ μS Transect Area ______

Corridor visibility ______ m

Methods: ( ) Snorkel (circle corridor or entire stream width)
( ) Electrofish
( ) Other ______

Habitat Type: (circle one) Pool, Riffle, Run/glide, Pocket Water

The mouth of Uleada Cr. is located 1.3m upstream from M.F. East River Road crossing.

STREAM PHYSICAL HABITAT DATA

STREAM Uleda Cr. DATE 8-2-95 COLLECTORS Lance Nelson, Mark Gilliland

EPA REACH ______ LENGTH 100' STRATUM ______

TRANSECT ______ GRADIENT %/VERTICAL DROP 15 %

CHANNEL TYPES: B - confined, flushing
C - meandered, depositional

GPS - N48°22.222' W116°42.311'

PERCENT HABITAT TYPE: Pool ____ Riffle 80 Run/Glide ____ Pocket Water 20

COMMENTS (about anything instructive...vegetative cover, bank stability, etc.) Dense vegetative cover - coniferous trees, deciduous brush. Located in a steep "V" shaped canyon. Fallen timber located throughout stream. W. Red Cedar dominant softwood. Very shady

Transect Length from Bottom	Width $\bar{X}$	Location on transect (l to r)	Depth $\bar{X}$	Velocity (run only)	Percent Substrate Class by Area				
					Sand	Gravel	Rubble Cobble	Boulder	Bedrock
100'	15'	1/4	.6'	est. 5 cfs			50/30	20	
		1/2							
		3/4							
		1/4							
		1/2							
		3/4							
		1/4							
		1/2							
		3/4							
		1/4							
		1/2							
		3/4							

Appendix H. Impromptu creel census data collected on streams in northern Idaho, 1995.

Stream (# officer visits)	Anglers interviewed	Hours fished	Catch rates (fish/hour)										
			RBT	CT	KOK	LT	BT	BK	LMB	BC	PE	MISC	Total[a]
Boulder Cr (1)	5	1											-
Brickel Cr (2)	11	17	0.24					1.41					1.65
Clark Fork R (25)	44	152	0.02		0.16	0.03							0.40
Cow Cr (2)	4	4											
Fish Cr (3)	3	8						0.50					0.50
Fry Cr (2)	1	2											
Gold Cr (4)	0												
Granite Cr - LPO drainage (10)	16	21.2	0.19										0.19
Granite Cr - Priest drainage (2)	2	1											-
Grouse Cr (5)	3	6.5		0.31									0.31
Hoodoo Cr (2)	2	0.5										BN=2.00	2.00
Kootenai R (6)	8	5.1											0
Lightning Cr (13)[b]	7	15											0
Moores Cr (4)	7	8		0.13				1.88					2.00
Moyie R (1)	3	6	1.00										1.00
NF Grouse Cr (2)	6	6.5											0

Appendix H. Continued.

Stream (# officer visits)	Anglers interviewed	Hours fished	Catch rates (fish/hour)										
			RBT	CT	KOK	LT	BT	BK	LMB	BC	PE	MISC	Total[a]
Pack R (20)	37	69.2											0.07
Pend Oreille R (10)	23	45											0.02
Porcupine Cr (2)	9	11											0
Lower Priest R (2)	4	12		0.08								WF=2.08	2.17
W B Priest R (1)	2	5	0.20	0.20				1.40					1.80
Rapid Lightning Cr (19)	14	35		0.03				0.06					0.09
Reeder Cr (1)	0												-
Sand Cr (1)	2	3											0
Trestle Cr (25)[c]	0												-
Twin Cr (1)	3	3											0
N.F. Coeur d'Alene River (2)	23	52		1.0									0.5
St Joe River (9)	108	69	0.04	[d]								WF=0.13	0.33
St Maries River (3)	18	38									0.08	CC=0.03 BH=1.1	1.18
Spokane River (3)	19	30											0
Totals	384 anglers	261.8 h											

RBT = rainbow trout, CT = cutthroat trout, KOK = kokanee salmon, LT = lake trout, BT = bull trout, BK = brook trout, BN= brown trout, LMB = largemouth bass, BC = black crappie, CC = channel catfish, PE = yellow perch, PS = pumpkinseed sunfish, BH = brown bullhead,

[a] May include other non-game species not listed above.

[b] Includes tributary streams to Lightning Cr .

[c] Trestle Cr. is closed to fishing, officer checks were of an enforcement nature.

[d] Incomplete catch data.

1995 ANNUAL PERFORMANCE REPORT

State of: Idaho

Program: Fisheries Management F-71-R-20

Project II: Technical Guidance

Subproject II-A: Panhandle Region

Contract Period: July 1, 1995 to June 30, 1996

ABSTRACT

Panhandle Region fisheries management personnel provided private individuals, organizations, public schools, and state and federal agencies with technical review and advice on various projects and activities that affect the fishery resources in northern Idaho. Technical guidance also included numerous angler informational meetings, presentations, and letters, development of the Panhandle Region portion of the 1-800-ASK-FISH program, and fishing clinics.

Authors:

Ned Horner
Regional Fishery Manager

Lance Nelson
Regional Fishery Biologist

OBJECTIVES

1. To furnish technical assistance, advice, and comments to other agencies, organizations, or individuals regarding projects that affect fishery resources in northern Idaho.

2. To promote the understanding of fish biology and fish habitat needs and the ethical use of the fishery resource through individual contact, public school curriculum, club meetings, public presentations, informational brochures, and fishing clinics.

METHODS

Regional fisheries management personnel provided both written and oral technical guidance.

RESULTS AND DISCUSSION

The technical guidance provided by Panhandle Region fish management personnel focused on activities that directly affected fishery resources or resource users in north Idaho. Numerous presentations and programs were made to civic and sportsmen's groups throughout the year. Letters were sent to numerous individuals and organizations in response to specific questions about the fisheries in northern Idaho.

School Aquarium Program

Technical advice was provided to public schools in Athol, Naples, Kellogg, Plummer, and Coeur d'Alene, Idaho, to develop an educational aquarium curriculum showing the development of fish eggs to fry and the subsequent release of those fish to rivers and lakes in the area. Fish eggs from a Department hatchery and required permits were also supplied for the programs. Fishery survey techniques and fish population estimates for trout were made in Cougar Creek, tributary of Coeur d'Alene Lake, with a biology class from Coeur d'Alene High School.

Fishing Clinics

Regional fishery management personnel coordinated four Free Fishing Day fishing clinics in the Panhandle Region. Department-sponsored clinics were held in Coeur d'Alene, Mullan, Bonners Ferry, and Round Lake State Park. We also provided fish and guidance for clinics at Priest Lake and St. Maries sponsored by the U.S. Forest Service. The clinics were geared toward teaching young anglers how to fish (casting, baiting hooks, etc.), fish identification, the reasons for regulations, fishing ethics, and how to clean fish. The emphasis was on education and not competition. Regional personnel, people from other state and federal agencies, and sportsmen's groups helped in making the clinics a big success.

1-800-ASK-FISH

Regional fishery management personnel provided information on northern Idaho fishing opportunities for the 1-800-ASK-FISH angler information program. Several tackle shops and local fishing experts were consulted weekly to provide additional information on fishing activities.

Pend Oreille Lake Water Management

The Regional Fisheries Manager continued to participate in efforts to change lake level management on Lake Pend Oreille. The proposal to reduce the existing 11.5 ft drawdown to a 6.5 ft drawdown has met with strong support from the public and equally strong opposition from the U.S. Army Corps of Engineers, electric utility industry, and Kalispel Indian Tribe. Efforts were made to include the Tribe's concerns in the comprehensive study proposal submitted to the Northwest Power Planning Council and address the utility concerns about impacts to hydropower sales. The Corps of Engineers also became concerned about erosion of potential cultural resources if the lake were held at higher winter pool levels.

State of Idaho Bull Trout Plan

The Regional Fishery Manager provided technical review and comments on Governor Batt's Bull Trout Conservation Plan for Idaho. Three public meetings were held to gather public opinion on the plan, and those comments were forwarded to the Governor's office. The Fishery Manager presented the plan to the Panhandle Basin Area Group, the committee designated to address bull trout recovery in northern Idaho. The Fishery Manager reviewed and commented on Montana's bull trout recovery plan, and white papers on hatchery production and exotic species impacts on bull trout.

Cabinet Gorge Relicensing

The Regional Fishery manager reviewed and commented on fisheries related data associated with the relicensing of Washington Water Power's Cabinet Gorge Dam. The Regional Environmental Staff Biologist is coordinating relicensing comments.

Winter Flood Response

Major winter rain-on-snow events in December 1995 and February 1996 caused widespread and significant flooding throughout the Panhandle Region. Regional Fish Management personnel evaluated the impact to fish populations, responded to agency requests for technical assistance for emergency repair work, wrote informational articles emplaning the probable impacts to fish populations and fisheries, and provided relief for flood victims as part of a statewide effort. Additional follow-up surveys will be needed.

Miscellaneous

Coordination meetings were held with hatchery, research, enforcement, and Fisheries Bureau personnel to insure management goals were achieved. Private pond permits, transport permits, and fish tournament applications were reviewed and forwarded. Requests for commercial guiding activities were reviewed and commented on. Extensive public involvement was sought to guide the 1996-2000 Five Year Fish Management Plan and 1996-1997 fishing regulations through a series of public meetings, newspaper, and other written media. The Regional Fishery Biologist in the north district coordinated with Kootenai County, Inland Empire Paper, and the Spirit Lake Anglers Association to enhance public access for boats at the Rocky Beach site on Spirit Lake.

1995 ANNUAL PERFORMANCE REPORT

State of: Idaho

Program: Fisheries Management F-71-R-20

Project III: Habitat Management

Subproject III-A: Panhandle Region

Contract Period: July 1, 1995 to June 30, 1996

ABSTRACT

Filter fabric weed mats were laid down next to the fishing dock at McArthur Reservoir in 1995 to create weed free fishing areas for bank anglers.

Additional rocks were placed in the rock check dam on Yellowbanks Creek, a tributary to Hayden Lake, in April of 1996 to enhance passage for westslope cutthroat trout *Oncorhynchus clarki lewisi.*

Permit applications, site survey, and planning were completed on the Sullivan Springs kokanee *O. nerka kennerlyi*/bull trout *Salvelinus confluentus* spawning channel in 1995 and 1996.

Authors:

Lance Nelson
Regional Fishery Biologist

Ned Horner
Regional Fishery Manager

METHODS

McArthur Reservoir Weed Mats

Weed barrier mats made of filter fabric cloth were laid down next to the fishing dock on McArthur Reservoir. Placement occurred during a low water period in McArthur Reservoir and the area where the mats were placed was dry at the time. Strips of weed mat measuring approximately 3 m by 6.5 m were weighted down with cement anchors attached to the corners of the mat. Slits were cut in the mats to allow air bubbles to escape and additional rocks were placed on the mats to keep them from floating to the surface. The cement anchors were constructed by filling five-gallon buckets with cement, and rebar rings were inserted to secure the weights to the mats. The ends of the mats were folded over lengths of 6 mm steel cables and sewn into place to attach the weed mats to the cement weights.

Yellowbanks Creek Check Dam

Additional large rock and boulders were hand-placed on top of the original rock check dam to increase the pool depth.

Sullivan Springs

Six sediment core samples were collected at random locations in the spawning channel and analyzed for percentage composition of various sized particles by the Idaho Department of Transportation Soils Laboratory in Coeur d'Alene, Idaho.

RESULTS AND DISCUSSION

McArthur Reservoir Weed Mats

The placement of the filter fabric weed mats next to the fishing docks on McArthur Reservoir will provide open water for anglers. The growth of rooted aquatic vegetation in McArthur Reservoir is dense enough to hinder fishing activity in late spring when the vegetation has grown up. Initial placement of the weed mats was without the addition of rocks on top of the mats. Subsequent air bubbles caused the mats to float to the surface. Cobble size rocks were dropped on top of the weed mats and allowed them to sink to the bottom.

Yellowbanks Creek Check Dam

In March of 1995 a rock check dam and a removable fishway were installed in Yellowbanks Creek to ease passage of spawning trout through a road culvert. High water during December of 1995 and February of 1996 shifted the rock check dam and the pool elevation was reduced. The addition of more large rock and boulders in the check dam raised the pool level such that fish passage through the culverts was made easier. Westslope cutthroat trout *Oncorhynchus clarki lewisi* were observed in Yellowbanks Creek upstream and downstream from the road crossing and in the culvert before, during, and after the rebuilding of the check dam.

Sullivan Springs Kokanee/Bull Trout Spawning Channel

The Regional Fishery Manager worked with the Cabinet Gorge Hatchery Manager, Engineering Bureau Chief, Grant Coordinator, Washington Water Power, and Lake Pend Oreille Idaho Club to conduct the necessary instream and upland surveys, secure permission from landowners, and secure permit applications to reconstruct the Sullivan Springs spawning channel. Six sediment core samples were taken in the spawning channel on December 15, 1994 to evaluate whether or not the gravel in the channel should be cleaned or replaced. The percentage of the material defined as sand ranged from 90% to 95%. Based on this analysis, the decision was made to replace the gravel. State and Federal stream alteration and 404 permits were submitted by April 15, 1996. Funding totaling $85,000 was pledged by Washington Water Power, Lake Pend Oreille Idaho Club, and the U.S. Fish and Wildlife Service's "Bring Back the Natives" grant program.

Sullivan Springs, tributary to Granite Creek on Pend Oreille Lake, supports the most significant tributary spawning run of kokanee *O. nerka kennerlyi* and the major egg source for hatchery fish for Pend Oreille Lake. Sullivan Springs has also been utilized by significant numbers of bull trout *Salvelinus confluentus*. Reconstruction of the channel is scheduled for July 1996.

1995 ANNUAL PERFORMANCE REPORT

State of: Idaho

Program: Fisheries Management F-71-R-20

Project IV: Population Management

Subproject IV-A: I-A -Panhandle Region

Contract Period: July 1, 1995 to June 30, 1996

ABSTRACT

No lakes in the Panhandle Region were restored with rotenone during this contract period.

Panhandle Region lowland lakes and rivers were stocked with 184,136 put-and-take rainbow trout *Oncorhynchus mykiss.* Put-grow-and-take stocking included 194,805 domestic Kamloops rainbow trout and 226,785 cutthroat trout *O. clarki.* Net pen releases of age 1 westslope cutthroat trout *O. clarki lewisi* in Pend Oreille Lake in 1995 totaled 61,588 fish. Other trout species stocked included 30,039 brook trout *Salvelinus fontinalis* and 5,360 brown trout *Salmo trutta* fingerlings. Five lowland lakes were stocked with 183,898 kokanee *O. nerka kennerlyi* fry and Pend Oreille Lake was stocked with over 14 million kokanee fry in 1995. Coeur d'Alene Lake received 30,198 fall chinook *O. tshawytscha* fingerlings. Channel catfish *Ictalurus punctatus* and tiger muskies *Esox lucius* x *E. masquinongy* were not available for stocking in 1995.

Hatchery personnel and volunteers stocked 31 mountain lakes in the Panhandle Region in 1995. Species stocked included westslope cutthroat trout, domestic Kamloops and Hayspur stock rainbow trout, brook trout, and Arctic grayling *Thymallus arcticus.* No golden trout *O. aguabonita* were stocked in 1995 in the Panhandle Region.

Authors:

Ned Horner
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Lance Nelson
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OBJECTIVES

1. Utilize rotenone to restore lowland lakes to productive trout fisheries when undesirable species become too numerous and there is support from the angling public.

2. Stock lowland lakes and sections of rivers to provide productive trout fisheries where wild trout recruitment is inadequate or angler effort is too high to maintain a fishery with wild production alone.

3. Stock low densities of kokanee *Oncorhynchus nerka kennerlyi* fry in select lowland lakes to create a unique fishery for large kokanee.

4. Utilize net pens to rear westslope cutthroat trout *O. clarki lewisi* for release in Pend Oreille Lake.

5. Stock hatchery reared channel catfish *Ictalurus punctatus* and tiger muskies *Esox lucius x E. masquinongy* to provide unique fisheries.

6. Provide diverse angling opportunities in mountain lakes of the Panhandle Region by maintaining a stocking program with different species of salmonids.

INTRODUCTION

Lowland and mountain lakes in the Panhandle Region are capable of growing trout and salmon, but recruitment from wild fish is lacking or inadequate to provide a fishery without stocking. Kokanee fry, put-grow-and-take rainbow trout *O. mykiss*, cutthroat trout, and a few brook trout *Salvelinus fontinalis* and brown trout *S. confluentus*, and put-and-take rainbow trout are utilized to create salmonid fisheries depending on the productivity of the lake and amount of angling effort it receives. Kokanee fry from the Cabinet Gorge Hatchery are stocked in Pend Oreille Lake to supplement wild production lost to the construction of Albeni Falls and Cabinet Gorge dams. Westslope cutthroat trout fingerlings are reared in net pens and released in Pend Oreille Lake. The net pen program is a cooperative project between local angling clubs, Washington Water Power, and Idaho Department of Fish and Game.

Some rivers are also stocked with put-and-take rainbow trout, but only where angler access is good and fishing effort is high. Stocked river sections are signed and advertized in brochures to improve returns, but the statewide guideline of a 40% return to the creel by numbers generally is not being met. Methods to increase returns, like stocking fewer fish more frequently, and stocking larger fish or sterile fish are being evaluated. Another alternative is to further reduce hatchery trout stocking in rivers, but this will require better public acceptance of restrictive regulations capable of maintaining wild trout. It may also involve the development of alternative fisheries, like catch-out ponds built along rivers.

New fisheries for warmwater species have been created by stocking channel catfish and tiger muskies in a few Panhandle Region lowland lakes. These fisheries will depend on continued maintenance stocking because summer temperatures are not adequate for channel catfish to reproduce and tiger muskies are a sterile hybrid.

METHODS

Lake restoration follows standard procedures in the Lake Renovation Procedures Manual (Horton 1997).

Hatchery personnel stocked put-and-take (catchable) rainbow trout into lowland lakes and drive-to mountain lakes throughout the Panhandle Region and sections of river in the Coeur d'Alene, St. Joe, and Moyie River drainages. Put-grow-and-take (fingerling) rainbow and cutthroat trout were utilized in larger lowland lakes or where a cutthroat fishery is desired. Net pen cutthroat trout were stocked as described in Horner et al. (1996). Brook trout were stocked in Bloom, Mirror, and Perkins lakes and brown trout *Salmo trutta* were stocked in Hoodoo Creek to provide specialty fisheries. Fall chinook salmon *O. tshawytscha* were stocked in Coeur d'Alene Lake to supplement wild production. Kokanee fry were stocked in five lowland lakes in densities ranging from approximately 140 to 750 fry/ha to provide fisheries for large kokanee. Kokanee fry from the Cabinet Gorge Hatchery were stocked in the Clark Fork River and Sullivan Springs, tributary to Granite Creek on the east side of Pend Oreille Lake, to supplement this regionally important kokanee fishery.

RESULTS AND DISCUSSION

Lake Restoration

No lakes were treated with rotenone in 1995.

Salmonid Stocking

In 1995, a total of 184,136 put-and-take rainbow trout were stocked in the Panhandle Region; 139,176 in 27 lowland and drive-to mountain lakes, and 44,960 in 8 rivers. Hayspur and domestic Kamloops rainbow trout were used for put-and-take stocking.

Fingerling westslope cutthroat trout from the Clark Fork Hatchery were stocked in Hayden, Jewel, Mirror, Spirit, and Pend Oreille lakes to provide put-grow-and-take fisheries. Some surplus cutthroat trout fry and broodstock were stocked in six other lakes (Table 1).

Fingerling brook trout were stocked in Bloom, Mirror, and Perkins lakes to maintain popular put-grow-and-take fisheries. There were surplus brook trout fingerlings in 1995 and they were stocked into six additional lakes. Hoodoo Creek is the only water in the Panhandle Region stocked with brown trout (Table 1).

Five lowland lakes in the Panhandle Region were stocked with low densities of kokanee fry to provide a unique fishery for larger than average sized kokanee (Table 2). Kokanee harvested from lakes managed as high yield fisheries (Coeur d'Alene, Spirit, and Pend Oreille lakes) typically average about 25 cm. In the lakes stocked with low densities of kokanee fry, fish from 38 cm to 56 cm have been caught,

Table 1. Summary of cutthroat, rainbow, brook and brown trout stocked in lowland lakes of the Panhandle Region, northern Idaho, in 1995.

Species Stocked	Lake Stocked		Number Stocked	Comments
Cutthroat Trout				
Fingerling Program	Hayden Lake		100,732	
	Jewel Lake		2,500	
	Mirror Lake		9,999	
	Spirit Lake		25,000	
	Pend Oreille Lake		26,996	North shore release
	Pend Oreille Lake		61,558	Net pen program
		Total	226,785	
Surplus Fry	Cocolalla Lake		131,897	
	Fernan Lake		41,319	
	Hauser Lake		82,545	
	Lower Twin Lake		48,200	
	Upper Twin Lake		68,889	
		Total	372,850	
Surplus Broodstock	Cocolalla Lake		226	
	Spirit Lake		225	
		Total	451	
Rainbow Trout	Hayden Lake		192,288	
	Jewel Lake		2,517	
		Total	194,805	
Brook Trout				
Fingerling Program	Bloom Lake		5,000	
	Mirror Lake		6,052	
	Perkins Lake		6,000	
		Total	17,052	
Surplus Fingerlings	Brush Lake		2,004	
	Hauser Lake		2,004	
	Kelso Lake		2,004	
	McArthur Lake		2,967	
	Robinson Lake		2,004	
	Smith Lake		2,004	
		Total	12,987	
Brown Trout	Hoodoo Creek		5,360	fingerlings

Table 2. Summary of kokanee and fall chinook salmon stocked in lowland lakes of the Panhandle Region, northern Idaho, in 1995.

Species Stocked	Lake Stocked	Number Stocked	Comments
Kokanee			
Lowland Lake Program	Brush Lake	6,000	
	Hauser Lake	62,027	
	Mirror Lake	5,000	
	Smith Lake	4,560	
	Lower Twin Lake	106,311	
	Total	183,890	
Pend Oreille Lake	Clark Fork River	4,399,821	
	Sullivan Springs	5,623,176	
	North Shore	4,027,460	Stocked at the Pringle Park, Boat Basin and Trestle Cr. Boat ramps
	Total	14,050,457	
Fall Chinook Salmon	Coeur d'Alene Lake	30,189	Stocked at the Mineral Ridge boat ramp

but catch rates are typically low and kokanee are included in the aggregate trout limit of 6 fish. Over 14 million kokanee fry from the Cabinet Gorge Hatchery were also stocked in Pend Oreille Lake (Table 2).

Coeur d'Alene Lake is the only Panhandle Region water stocked with chinook salmon (Table 2). A detailed report on the Coeur d'Alene Lake chinook/kokanee program is in Job 1-b of this report. Detailed stocking records for all species stocked in the Panhandle Region are available in the Idaho Department of Fish and Game 1995 stocking records booklet available through individual hatcheries and regional or headquarters offices.

Net Pen Cutthroat Trout

A total of 61,588 one-year-old westslope cutthroat trout were released from eight net pens located in Ellisport, Scenic, and Garfield bays on Lake Pend Oreille, Idaho, in April and June of 1995 (Table 3). The April release consisted of 57,220 fish at an average length of 149 mm. The June release of 4,348 fish averaged 184 mm in length. Due to a tear in the net pen located at East Hope, Ellisport Bay, only 480 cutthroat were remaining in the net for release on June 16 (Table 3). Every cutthroat trout received an adipose fin clip prior to being placed in the net pens in the fall of 1994. Since the inception of the program in the fall of 1989 (Horner et al. 1995), a total of 292,619 westslope cutthroat trout have been reared in net pens and released in Pend Oreille Lake (Table 3). Net pen releases, with the exception of 1994 when 15,030 two year-old-fish were released (Horner et al. 1997), consist of one-year-old cutthroat trout. In 1994, to evaluate the return to the creel of one year old and two year old releases, 145 one year old cutthroat and 148 two year old cutthroat were floy tagged. No tags were returned by anglers in 1995.

Mountain Lake Stocking

Of the 31 mountain lakes stocked in the Panhandle Region in 1995, 24 of them were stocked with westslope cutthroat trout, 2 with domestic Kamloops rainbow trout, and 5 with Arctic grayling *Thymallus arcticus* (Appendix A). No golden trout *O. aguabonita* were available for stocking in 1995. Stocking histories for mountain lakes in the Panhandle Region during the past 12 years are summarized in Appendix A. The odd year/even year stocking schedules for Panhandle Region mountain lakes are given in Appendices B and C, respectively. Eight lakes scheduled for stocking in 1995 were not stocked (Mollies, McCormick, Beehive, Bloom, Caribou, Gold, Copper, and Silver), primarily due to lack of fish or logistical problems. Long Mountain Lake was mistakenly stocked with cutthroat trout instead of Arctic grayling and Pyramid Lake was overstocked.

Table 3. The numbers, age and size of net pen reared westslope cutthroat trout released into Pend Oreille Lake, Idaho, 1990 - 1995.

Year	No. of fish released	Age	Mean length at release (mm)	No. of net pens	Release date
1990	38,841	1	160	4	May
1991	34,870	1	171	6	May 31
1992	50,130	1	173	6	May 15
1993	46,160	1	173	6	May 15-16
1994	46,000	1	167	5	April 19-
	15,030	2	223	3	May 11
1995	57,220	1	149	6	April 19
	4,348	1	184	2	June 16

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APPENDICES

Appendix A. Number and species of fish (fry except where noted) stocked into mountain lakes in the Panhandle Region from 1982-1995.

Drainage	Lake	Surface acres	Year stocked	Number stocked	Stocking rate (fish/acre)	Stock of fish	Comments
Kootenai	Hidden	50	1982	15,656	313	Kamloops rainbow	
	(1-103)		1983	12,107	242	Henrys Lake cutthroat	
			1984	12,768	255	Kamloops rainbow	
			1985	12,512	250	Westslope cutthroat	
			1986	6,000	120	Westslope cutthroat	
			1987	12,500	250	Westslope cutthroat	
			1988	12,096	242	Kamloops rainbow	
			1989	3,082	62	Kamloops rainbow	
			1989	12,495	250	Westslope cutthroat	
			1990	12,928	258	Kamloops rainbow	
			1991	12,500	250	Westslope cutthroat	
			1992	8,440	169	Kamloops rainbow	
			1993	12,000	242	Westslope cutthroat	
			1994	12,500	250	Hayspur rainbow	
			1995	12,500	250	Westslope cutthroat	
	Lake Mountain	7	1983	1,723	246	Henrys Lake cutthroat	
	(Cutoff)		1985	1,748	250	Westslope cutthroat	
	(1-104)		1987	1,750	250	Westslope cutthroat	
			1989	1,750	250	Westslope cutthroat	
			1991	1,750	250	Westslope cutthroat	
			1995	1,750	250	Westslope cutthroat	
	West Fork	12	1982	3,648	304	Kamloops rainbow	
	(1-109)		1983	3,016	251	Henrys Lake cutthroat	
			1984	3,010	251	Kamloops rainbow	
			1985	2,990	250	Westslope cutthroat	
			1986	4,495	375	Westslope cutthroat	
			1987	3,000	250	Westslope cutthroat	
			1988	3,007	250	Westslope cutthroat	
			1989	3,087	257	Kamloops rainbow	
			1990	3,000	250	Westslope cutthroat	

Appendix A. Continued.

Drainage	Lake	Surface acres	Year stocked	Number stocked	Stocking rate (fish/acre)	Stock of fish	Comments
Kootenai	West Fork (cont.)		1991	3,000	250	Kamloops rainbow	
			1992	3,000	250	Westslope cutthroat	
			1993	3,006	250	Kamloops rainbow	
			1994	3,000	250	Westslope cutthroat	
			1995	3,000	250	Westslope cutthroat	
	Long Mountain (1-112)	3	1987	1,000	333	Grayling	
			1990	1,500	500	Grayling	
			1991	1,500	500	Grayling	
			1992	664	331	Grayling	
			1993	1,500	500	Grayling	
			1995	1,505	501	Westslope cutthroat	Cutthroat stocked by mistake
	Parker (1-113)	3	1986	1,225	408	Golden trout	
			1988	1,002	334	Grayling	
			1990	1,410	470	Golden trout	
			1991	1,500	500	Grayling	
			1992	265	122	Grayling	
			1993	1,042	347	Grayling	
			1995	1,000	333	Grayling	
	Long Canyon (Smith) (1-115)	6	1987	2,000	333	Grayling	
			1988	3,000	500	Grayling	
			1990	3,000	500	Grayling	
			1991	1,000	167	Grayling	
			1993	704	117	Grayling	
			1995	3,000	500	Grayling	
	Big Fisher (1-117)	10	1983	2,486	248	Henrys Lake cutthroat	
			1985	2,530	253	Westslope cutthroat	

Appendix A. Continued.

Drainage	Lake	Surface acres	Year stocked	Number stocked	Stocking rate (fish/acre)	Stock of fish	Comments
Kootenai	Big Fisher (cont.)		1987	2,500	250	Westslope cutthroat	
			1990	2,500	250	Westslope cutthroat	
			1992	2,500	250	Westslope cutthroat	
			1994	2,500	250	Westslope cutthroat	
	Myrtle (1-122)	20	1983	5,189	259	Westslope cutthroat	
			1985	5,100	255	Westslope cutthroat	
			1987	5,000	250	Westslope cutthroat	
			1989	5,000	250	Westslope cutthroat	
			1991	4,953	248	Westslope cutthroat	
			1993	5,075	254	Westslope cutthroat	
			1995	5,000	250	Westslope cutthroat	
	Trout (1-124)	7	1982	3,296	471	Kamloops rainbow	
			1983	1,720	247	Henrys Lake cutthroat	
			1984	1,733	248	Kamloops rainbow	
			1985	1,748	250	Westslope cutthroat	
			1986	1,721	246	Westslope cutthroat	
			1987	1,751	250	Westslope cutthroat	
			1988	1,743	250	Westslope cutthroat	
			1990	1,750	250	Westslope cutthroat	
			1992	1,750	250	Kamloops rainbow	
			1994	1,750	250	Kamloops rainbow	
	Pyramid (1-125)	11	1982	3,296	300	Kamloops rainbow	
			1983	2,702	246	Henrys Lake cutthroat	
			1984	2,736	249	Kamloops rainbow	
			1985	2,760	251	Westslope cutthroat	
			1986	2,741	249	Westslope cutthroat	
			1987	2,750	250	Westslope cutthroat	
			1988	2,752	250	Westslope cutthroat	
			1989	2,750	250	Kamloops rainbow	

Appendix A. Continued.

Drainage	Lake	Surface acres	Year stocked	Number stocked	Stocking rate (fish/acre)	Stock of fish	Comments
Kootenai	Pyramid(cont.)		1990	2,765	251	Westslope cutthroat	
			1991	2,750	250	Kamloops rainbow	
			1992	2,750	250	Westslope cutthroat	
			1993	2,805	255	Kamloops rainbow	
			1994	1,750	250	Westslope cutthroat	
			1995	4,000	364	Westslope cutthroat	Requested 250/ac
	Ball Creek (1-126)	6	1983	1,513	255	Henrys Lake cutthroat	
			1984	1,000	167	Westslope cutthroat	
			1986	1,498	250	Westslope cutthroat	
			1988	1,500	250	Westslope cutthroat	
			1990	1,500	250	Westslope cutthroat	
			1992	1,500	250	Westslope cutthroat	
			1994	1,000	167	Westslope cutthroat	
	Little Ball Creek (1-127)	4	1984	1,500	375	Westslope cutthroat	
			1986	956	239	Westslope cutthroat	
			1988	1,000	250	Westslope cutthroat	
			1990	1,000	250	Westslope cutthroat	
			1992	1,000	250	Westslope cutthroat	
			1994	1,500	375	Westslope cutthroat	
	Snow (1-134)	10	1982	3,008	301	Westslope cutthroat	
			1983	2,872	287	Henrys Lake cutthroat	
			1987	2,500	250	Westslope cutthroat	
			1989	2,400	240	Westslope cutthroat	
			1991	2,500	250	Westslope cutthroat	
			1993	2,500	250	Westslope cutthroat	
			1995	2,500	250	Westslope cutthroat	

Appendix A. Continued.

Drainage	Lake	Surface acres	Year stocked	Number stocked	Stocking rate (fish/acre)	Stock of fish	Comments
Kootenai	Roman Nose #1 (1-135)	16	1993	390	24	Bull trout	(brook trout control)
	Roman Nose #2 (1-136)	7.9	1993	162	21	Bull trout	(brook trout control)
	Roman Nose #3 (1-137)	12	1983	2,320	193	Domestic Kamloops	(size 2)
			1985	3,000	250	Westslope cutthroat	
			1986	3,000	250	Westslope cutthroat	
			1987	3,000	250	Westslope cutthroat	
			1988	3,000	250	Westslope cutthroat	
			1989	3,000	250	Kamloops rainbow	
			1990	1,000	83	Westslope cutthroat	(size 2)
			1991	3,150	262	Kamloops rainbow	
			1992	1,305	109	Westslope cutthroat	(size 2)
			1993	3,000	250	Kamloops rainbow	
			1994	3,772	314	Westslope cutthroat	772 were size 2
			1995	3,000	250	Westslope cutthroat	(size 1)
	Solomon (1-146)	9	1993	500	56	Kamloops rainbow	Winter killed in 1992, shift stocking to put-and-take rainbow
			1994			Not stocked	
			1995	1,508	167	Kamloops rainbow	
				500	55	Hayspur rainbow	
	Queen (1-148)	5	1983	1,296	259	Henrys Lake cutthroat	
			1986	1,250	250	Westslope cutthroat	
			1988	1,250	250	Westslope cutthroat	
			1990	1,250	250	Westslope cutthroat	
			1992	1,250	250	Westslope cutthroat	

Appendix A. Continued.

Drainage	Lake	Surface acres	Year stocked	Number stocked	Stocking rate (fish/acre)	Stock of fish	Comments
Kootenai	Debt	5	1985	1,250	250	Westslope cutthroat	
	(1-150)		1989	1,250	250	Westslope cutthroat	
			1991	1,250	250	Westslope cutthroat	
			1993	1,250	250	Westslope cutthroat	
			1995	1,250	250	Westslope cutthroat	
	Spruce	5	1982	2,432	486	Kamloops rainbow	
	(1-154)		1983	1,297	259	Henrys Lake cutthroat	
			1984	2,520	504	Kamloops rainbow	
			1985	1,250	250	Westslope cutthroat	
			1986	1,250	250	Westslope cutthroat	
			1987	1,250	250	Westslope cutthroat	
			1988	1,250	250	Westslope cutthroat	
			1989	1,265	253	Westslope cutthroat	
			1990	1,250	250	Westslope cutthroat	
			1991	1,247	250	Kamloops rainbow	
			1992	1,250	250	Westslope cutthroat	
			1993	1,250	250	Kamloops rainbow	
			1994	1,360	272	Westslope cutthroat	
			1995	1,269	254	Westslope cutthroat	
	Copper	5	1983	1,297	259	Henrys Lake cutthroat	
	(1-155)		1984	1,390	278	Westslope cutthroat	
			1986	1,250	250	Westslope cutthroat	
			1988	1,247	250	Westslope cutthroat	
			1990	1,250	250	Westslope cutthroat	
			1992	1,250	250	Westslope cutthroat	
			1994	1,360	273	Westslope cutthroat	
	Callahan	10	1984	2,500	250	Westslope cutthroat	
	(Smith)		1987	2,522	252	Westslope cutthroat	
	(1-160)		1988	2,500	250	Westslope cutthroat	

Appendix A. Continued.

Drainage	Lake	Surface acres	Year stocked	Number stocked	Stocking rate (fish/acre)	Stock of fish	Comments
Kootenai	Callahan (cont.)		1992	2,563	251	Westslope cutthroat	
			1993	2,514	250	Westslope cutthroat	
			1995	2,500	250	Westslope cutthroat	
	Estelle	5	1988	1,075	215	Brown trout	Test control
	(1-167)		1990	500	100	Brown trout (size 3)	of stunted
			1992	150	30	Brown trout (size 2)	brook trout
Pend Oreille	Hunt	12	1982	3,648	304	Kamloops rainbow	
	(2-101)		1985	3,000	250	Westslope cutthroat	
			1986	3,000	250	Westslope cutthroat	
			1987	3,033	253	Westslope cutthroat	
			1988	3,000	250	Westslope cutthroat	
			1989	5,000	417	Westslope cutthroat	
			1990	3,000	250	Westslope cutthroat	
			1991	3,000	250	Westslope cutthroat	
			1992	3,023	252	Westslope cutthroat	
			1993	3,000	250	Westslope cutthroat	
			1994	3,000	250	Westslope cutthroat	
			1995	3,020	252	Westslope cutthroat	
	Standard	16	1983	4,021	251	Henrys Lake cutthroat	
	(2-103)		1985	4,000	250	Westslope cutthroat	
			1987	3,962	248	Westslope cutthroat	
			1989	4,000	250	Westslope cutthroat	
			1991	4,000	250	Westslope cutthroat	
			1993	4,020	251	Westslope cutthroat	
			1995	4,000	250	Westslope cutthroat	
	Two Mouth #1 (2-106)	?	1981	2,258	--	Westslope cutthroat	Discontinued stocking due to winter kill

Appendix A. Continued.

Drainage	Lake	Surface acres	Year stocked	Number stocked	Stocking rate (fish/acre)	Stock of fish	Comments
Pend Oreille	Two Mouth #2	5	1983	2,054	411	Henrys Lake cutthroat	
	(2-107)		1985	1,265	253	Westslope cutthroat	
			1987	1,269	254	Westslope cutthroat	
			1989	1,265	253	Westslope cutthroat	
			1991	1,250	250	Westslope cutthroat	
			1993	1,327	265	Westslope cutthroat	
			1995	1,250	250	Westslope cutthroat	
	Two Mouth #3	20	1983	4,973	249	Henrys Lake cutthroat	
	(2-108)		1984	5,280	264	Westslope cutthroat	
			1986	5,000	250	Westslope cutthroat	
			1988	5,000	250	Westslope cutthroat	
				5,000	250	Westslope cutthroat	
			1992	5,000	250	Westslope cutthroat	
			1994	5,000	250	Westslope cutthroat	
	Mollies	2	1983	648	324	Henrys Lake cutthroat	
	(2-114)		1985	506	253	Westslope cutthroat	
			1987	508	254	Westslope cutthroat	
			1989	500	250	Westslope cutthroat	
			1991	500	250	Westslope cutthroat	
			1993	503	251	Westslope cutthroat	
	Caribou	6.8	1984	1,752	258	Henrys Lake cutthroat	(near West Fk. Mtn)
	(2-116)		1986	1,750	257	Westslope cutthroat	
			1987	1,750	257	Westslope cutthroat	
			1988	1,750	257	Westslope cutthroat	
			1990	1,750	257	Westslope cutthroat	
			1992	1,750	257	Westslope cutthroat	
			1994	1,750	257	Westslope cutthroat	

Appendix A. Continued.

Drainage	Lake	Surface acres	Year stocked	Number stocked	Stocking rate (fish/acre)	Stock of fish	Comments
Pend Oreille	Fault	6	1983	2,872	478	Henrys Lake cutthroat	
	(Hunt Peak #1)		1985	1,500	250	Westslope cutthroat	
	(2-121)		1987	1,500	250	Westslope cutthroat	
			1989	1,553	259	Westslope cutthroat	
			1991	2,275	379	Westslope cutthroat	Received McCormick
			1993	1,500	250	Westslope cutthroat	Lake fish as well.
			1995	1,500	250	Westslope cutthroat	
	McCormick	3.1	1985	780	252	Westslope cutthroat	
	(Hunt Peak #2)		1987	775	250	Westslope cutthroat	
	(2-122)		1989	805	260	Westslope cutthroat	
			1991	816	263	Westslope cutthroat	
			1993	775	250	Westslope cutthroat	
			1995	775	250	Westslope cutthroat	
	Little Harrison	6.5	1983	1,651	254	Henrys Lake cutthroat	
	(2-126)		1987	1,625	250	Westslope cutthroat	
			1988	1,625	250	Westslope cutthroat	
			1990	1,625	250	Westslope cutthroat	
			1992	1,625	250	Westslope cutthroat	
			1995	1,625	250	Westslope cutthroat	
	Beehive	7	1983	1,723	246	Henrys Lake cutthroat	
	(2-128)		1985	1,740	248	Westslope cutthroat	
			1986	1,803	258	Westslope cutthroat	
			1987	1,750	250	Westslope cutthroat	
			1989	2,164	309	Westslope cutthroat	
			1991	1,750	250	Westslope cutthroat	
			1993	1,750	250	Westslope cutthroat	
			1995	1,801	257	Westslope cutthroat	
	Harrison	29	1982	6,972	240	Kamloops rainbow	
	(2-129)		1983	7,243	250	Henrys Lake cutthroat	
			1984	7,296	250	Kamloops rainbow	

Appendix A. Continued.

Drainage	Lake	Surface acres	Year stocked	Number stocked	Stocking rate (fish/acre)	Stock of fish	Comments
Pend Orielle	Harrison (cont.)		1985	7,200	248	Westslope cutthroat	
			1986	6,870	237	Westslope cutthroat	
			1987	7,264	250	Westslope cutthroat	
			1988	7,250	250	Westslope cutthroat	
			1989	7,479	258	Westslope cutthroat	
			1990	7,250	250	Westslope cutthroat	
			1991	7,246	250	Westslope cutthroat	
			1992	7,250	250	Westslope cutthroat	
			1993	7,250	250	Westslope cutthroat	
			1994	7,250	250	Westslope cutthroat	
			1995	7,266	250	Westslope cutthroat	
	Beaver	5	1990	500	100	Brown trout (size 3)	Test control of
	(2-130)		1992	150	30	Brown trout (size 2)	stunted brook trout
	Dennick	8	1983	1,939	242	Henrys Lake cutthroat	
	(2-171)		1984	2,060	258	Westslope cutthroat	
			1985	2,010	251	Westslope cutthroat	
			1986	2,500	312	Westslope cutthroat	
			1987	2,000	250	Westslope cutthroat	
			1988	2,000	250	Westslope cutthroat	
			1989	2,064	258	Westslope cutthroat	
			1990	2,000	250	Westslope cutthroat	
			1991	2,000	250	Westslope cutthroat	
			1992	2,000	250	Westslope cutthroat	
			1992	150	19	Brown trout	Stocked by mistake
			1993	2,053	257	Westslope cutthroat	(helicopter plant)
			1994	2,000	250	Westslope cutthroat	
			1995	2,000	250	Westslope cutthroat	
	Sand	5	1982	8,360	1,672	Kokanee	
	(2-172)		1983	1,221	244	Henrys Lake cutthroat	

Appendix A. Continued.

Drainage	Lake	Surface acres	Year stocked	Number stocked	Stocking rate (fish/acre)	Stock of fish	Comments
Pend Oreille	Sand (cont.)		1984	1,254	251	Westslope cutthroat	
			1985	1,260	252	Westslope cutthroat	
			1986	1,250	250	Westslope cutthroat	
			1987	1,250	250	Westslope cutthroat	
			1988	1,247	250	Westslope cutthroat	
			1989	1,250	250	Westslope cutthroat	
			1990	1,250	250	Westslope cutthroat	
			1991	1,250	250	Westslope cutthroat	
			1992	1,250	250	Westslope cutthroat	
			1993	1,026	205	Westslope cutthroat	
			1994	1,250	250	Westslope cutthroat	
			1995	1,250	250	Westslope cutthroat	
	Bloom (2-173)	20	1982	10,620	531	Brook trout	
			1984	5,041	252	Brook trout	
			1985	4,599	230	Brook trout	
			1986	5,360	268	Brook trout	
			1987	5,000	250	Brook trout	
			1988	5,000	250	Brook trout	
			1989	5,000	250	Brook trout	
			1990	10,013	500	Brook trout	
			1990	500	25	Splake	(size 2)
			1991	4,000	200	Brook trout	
			1992	5,000	250	Brook trout	
			1992	2,000	100	Westslope cutthroat	Stocked by mistake (helicopter plant)
			1992	500	25	Splake	(size 2)
			1993	5,000	250	Brook trout	
			1993	502	25	Splake	(size 2)
			1994	5,000	25	Brook trout	(size 2)
			1995	5,000	250	Brook trout	(size 2)

Appendix A. Continued.

Drainage	Lake	Surface acres	Year stocked	Number stocked	Stocking rate (fish/acre)	Stock of fish	Comments
Pend Oreille	Porcupine	13	1982	1,296	100	Kamloops rainbow	
	(2-182)		1983	2,872	220	Domestic Kamloops	(size 2)
			1984	1,016	78	Catchable rainbow	Shift management
			1985	1,000	77	Catchable rainbow	to put-and-take
			1986	1,075	83	Mt. Lassen rainbow	(size 3)stocking
			1987	--	--		Road washed out
			1988	600	46	Mt. Lassen rainbow	
			1989	690	53	Mt. Lassen rainbow	
			1990	750	58	Catchable rainbow	
			1991	--	--	Not stocked	Road washed out
			1993	387	30	Kamloops rainbow	
			1994	303	23	Hayspur rainbow	
			1995	1,039	80	Hayspur rainbow	
	Moose	16.5	1987	1,000	61	Brown trout	Test control on
	(2-185)		1988	4,515	274	Brown trout	stunted brook trout
			1990	500	30	Brown trout	(size 3)
			1992	500	30	Brown trout	(size 2)
	Antelope	16	1982	5,032	314	Westslope cutthroat	
	(2-190)		1989	1,155	72	Mt. Lassen rainbow	(size 3)
			1990	1,000	63	Catchable rainbow	
			1990	200	12	Westslope cutthroat	(Broodstock)
			1991	2,000	125	Westslope cutthroat	(size 2)
			1991	1,100	69	Eagle Lake rainbow	(size 3)
			1991	50	3	Eagle Lake rainbow	Creston broodstock
			1992	1,363	85	Hayspur rainbow	(size 3)
			1993	1,387	87	Hayspur rainbow	(size 3)
			1994	1,000	62	Hayspur rainbow	(Size 3)
			1995	185	11	Kamloop rainbow	
			1995	2,649	165	Hayspur rainbow	

Appendix A. Continued.

Drainage	Lake	Surface acres	Year stocked	Number stocked	Stocking rate (fish/acre)	Stock of fish	Comments
Pend Oreille	Caribou	6.8	1983	2,872	422	Henrys Lake cutthroat	(near Keokee Mtn.)
	(2-196)		1984	1,750	257	Westslope cutthroat	
			1985	1,700	250	Westslope cutthroat	
			1986	1,500	220	Westslope cutthroat	
			1987	1,704	250	Westslope cutthroat	
			1988	1,722	253	Westslope cutthroat	
			1989	1,700	250	Westslope cutthroat	
			1990	1,700	250	Westslope cutthroat	
			1991	1,700	250	Westslope cutthroat	
			1992	1,750	257	Westslope cutthroat	
			1993	1,700	250	Westslope cutthroat	
			1994	1,700	250	Westslope cutthroat	
Spokane	Elsie	10	1982	1,440	144	Catchable rainbow	Stock put-and-take
	(3-119)		1983	1,500	150	Catchable rainbow	(size 3)rainbow
			1984	2,865	286	Catchable rainbow	
			1985	3,005	300	Catchable rainbow	
			1986	3,024	302	Catchable rainbow	
			1987	2,000	200	Hayspur rainbow	
			1988	4,050	405	Hayspur rainbow	
			1989	2,856	284	Mt. Lassen rainbow	
			1990	3,000	300	Eagle Lake	
			1991	3,516	350	Hayspur rainbow	
			1992	4,020	402	Hayspur rainbow	
			1993	4,045	404	Hayspur rainbow	
			1994	2,264	226	Hayspur rainbow	
			1995	4,042	404	Hayspur rainbow	
	Lower Glidden	12	1982	1,880	157	Catchable rainbow	Stock annually
	(3-123)		1983	1,000	83	Catchable rainbow	with put-and-take
			1984	4,945	412	Catchable rainbow	(size 3) rainbow
			1985	3,018	251	Catchable rainbow	

Appendix A. Continued.

Drainage	Lake	Surface acres	Year stocked	Number stocked	Stocking rate (fish/acre)	Stock of fish	Comments
Spokane	Lower Glidden (cont.)		1986	3,011	251	Catchable rainbow	
			1987	3,277	273	Hayspur rainbow	
			1988	3,001	250	Hayspur rainbow	
			1989	2,836	236	Mt. Lassen rainbow	
			1990	1,775	148	Catchable rainbow	
			1991	1,986	165	Hayspur rainbow	(size 3)
			1992	3,534	295	Hayspur rainbow	
			1993	4,005	334	Hayspur rainbow	
			1994	2,212	184	Hayspur rainbow	
			1995	4,042	337	Hayspur rainbow	
	Upper Glidden (3-124)	10	1980	992	99	Kamloops rainbow	
			1993	180	18	Bull trout	Brook trout control
	Gold (3-125)	3	1983	1,005	335	Henrys Lake cutthroat	Shallow, need to evaluate survival
			1987	750	250	Westslope cutthroat	
			1989	750	250	Westslope cutthroat	
			1991	750	250	Mt. Lassen rainbow	
			1993	500	167	Kamloops rainbow	
	Revett (3-130)	12	1980	992	83	Kamloops rainbow	
			1993	309	26	Bull trout	Brook trout control
	Crater (3-133)	5	1983	5,000	1,000	Grayling	Reserve for grayling.
			1987	2,100	420	Grayling	
			1988	2,500	500	Grayling	
			1990	2,500	500	Grayling	
			1991	2,500	500	Grayling	
			1993	2,500	500	Grayling	
			1995	1,750	340	Grayling	

Appendix A. Continued.

Drainage	Lake	Surface acres	Year stocked	Number stocked	Stocking rate (fish/acre)	Stock of fish	Comments
Spokane	Dismal (3-138)	?	1983	1,500	--	Catchable rainbow	Reduce stocking to 250 put-and-take rainbow and evaluate
			1984	537	--	Catchable rainbow	
			1985	490		Catchable rainbow	
			1986	253	--	Catchable rainbow	
			1987	249	--	Hayspur rainbow	
			1988	260	--	Mt. Lassen rainbow	
			1988	260	--	Hayspur rainbow	
			1989	225	--	Mr. Lassen rainbow	
			1990	250	--	Catchable rainbow	
			1991	243	--	Hayspur rainbow	
			1992	250	--	Hayspur rainbow	
			1993	230	--	Hayspur rainbow	
			1994	265	--	Hayspur rainbow	
			1995	252	--	Hayspur rainbow	
	Bacon (3-144)	9	1985	2,255	250	Westslope cutthroat	
			1987	2,250	250	Westslope cutthroat	
			1989	2,250	250	Westslope cutthroat	
			1991	2,250	250	Westslope cutthroat	
			1993	2,250	250	Westslope cutthroat	
			1995	2,320	258	Westslope cutthroat	
	Forage (3-146)	13	1987	3,150	242	Golden trout	Reserve for golden trout or grayling.
			1988	3,250	250	Grayling	
			1989	2,000	154	Grayling	
			1990	3,250	250	Golden trout	
			1992	600	46	Grayling	
			1993	3,250	250	Grayling	
			1995	670	52	Grayling	
	Halo (3-147)	12	1985	3,010	251	Westslope cutthroat	
			1987	3,000	250	Westslope cutthroat	

Appendix A. Continued.

Drainage	Lake	Surface acres	Year stocked	Number stocked	Stocking rate (fish/acre)	Stock of fish	Comments
Spokane	Halo (cont.)		1989	3,000	250	Westslope cutthroat	
			1991	3,000	250	Westslope cutthroat	
			1993	3,000	250	Westslope cutthroat	
			1995	3,118	260	Westslope cutthroat	
	Crystal (3-160)	10	1983	4,380	438	Henrys Lake cutthroat	
			1985	2,510	251	Westslope cutthroat	
			1987	2,510	251	Westslope cutthroat	
			1988	2,500	250	Westslope cutthroat	
			1989	2,500	250	Westslope cutthroat	
			1991	2,500	250	Westslope cutthroat	
			1993	2,500	250	Westslope cutthroat	
			1995	2,520	250	Westslope cutthroat	
Little North Fork Clearwater	Devils Club (6-113)	4	1986	1,000	250	Westslope cutthroat	
			1988	1,000	250	Westslope cutthroat	
			1991	1,093	273	Westslope cutthroat	
			1992	1,000	250	Westslope cutthroat	
	Big Talk (6-114)	?	1986	1,500	--	Westslope cutthroat	
			1988	2,500	--	Westslope cutthroat	
			1990	2,737	--	Westslope cutthroat	
			1992	2,500	--	Westslope cutthroat	
	Larkins (6-117)	12	1986	3,000	250	Westslope cutthroat	
			1988	3,000	250	Westslope cutthroat	
			1990	3,278	273	Westslope cutthroat	
	Mud (6-118)	6	1987	1,500	250	Westslope cutthroat	
			1989	1,500	250	Westslope cutthroat	
			1991	1,500	250	Mt. Lassen rainbow	
			1993	1,500	250	Hayspur rainbow	

Appendix A. Continued.

Drainage	Lake	Surface acres	Year stocked	Number stocked	Stocking rate (fish/acre)	Stock of fish	Comments
Little	Mud (cont.)		1995	1,500	250	Trout Lake rainbow	
North Fork							
Clearwater	Hero	4	1986	1,000	250	Westslope cutthroat	
	(6-119)		1988	1,000	250	Westslope cutthroat	
			1990	1,093	273	Westslope cutthroat	
			1992	1,000	250	Westslope cutthroat	
	Heart	40	1986	10,000	250	Westslope cutthroat	
	(6-122)		1990	10,000	250	Mt. Lassen rainbow	
			1992	10,000	250	Mt. Lassen rainbow	
			1994	3,865	97	Kamloops rainbow	
	Northbound	12	1986	3,000	250	Westslope cutthroat	
	(6-123)		1988	3,000	250	Westslope cutthroat	
			1990	3,278	273	Westslope cutthroat	
			1992	3,000	250	Westslope cutthroat	
			1994	500	42	Westslope cutthroat	
	Skyland	13	1987	3,250	250	Westslope cutthroat	
	(6-125)		1989	3,250	250	Westslope cutthroat	
			1991	3,250	250	Mt. Lassen rainbow	
			1993	3,250	250	Hayspur rainbow	
			1995	3,250	250	Trout Lake rainbow	
	Fawn	13	1986	3,250	250	Westslope cutthroat	
	(6-126)		1988	3,250	250	Westslope cutthroat	
			1990	3,565	274	Westslope cutthroat	
			1992	3,250	250	Westslope cutthroat	
	Noseeum	4	1985	1,008	252	Westslope cutthroat	
	(6-130)		1987	1,000	250	Westslope cutthroat	
			1989	1,000	250	Westslope cutthroat	
			1991	1,000	250	Westslope cutthroat	

Appendix A. Continued.

Drainage	Lake	Surface acres	Year stocked	Number stocked	Stocking rate (fish/acre)	Stock of fish	Comments
Little North Fork Clearwater	Noseeum (cont.)		1993	1,000	250	Westslope cutthroat	
			1995	1,007	252	Westslope cutthroat	
	Steamboat (6-131)	9	1986	2,000	222	Grayling	Reserve for grayling.
			1988	4,500	500	Grayling	
			1989	2,000	222	Grayling	
			1990	4,500	500	Grayling	
			1991	3,500	389	Grayling	
			1992	650	72	Grayling	
			1993	4,500	500	Grayling	
			1995	3,000	333	Grayling	
	Copper (6-201)	3	1985	765	255	Westslope cutthroat	
			1989	750	250	Westslope cutthroat	
			1991	750	250	Westslope cutthroat	
			1992	1,250	417	Westslope cutthroat	
			1993	750	250	Westslope cutthroat	
	Gold (6-202)	8	1986	2,000	250	Westslope cutthroat	
			1988	2,000	250	Westslope cutthroat	
			1990	2,185	273	Westslope cutthroat	
	Tin (6-204)	3	1987	750	250	Westslope cutthroat	
			1988	750	250	Westslope cutthroat	
			1990	750	250	Blackfoot rainbow	
			1992	750	250	Mt. Lassen rainbow	
			1994	750	250	Kamloops rainbow	

Appendix A. Continued.

Drainage	Lake	Surface acres	Year stocked	Number stocked	Stocking rate (fish/acre)	Stock of fish	Comments
Little North Fork Clearwater	Silver (6-205)	10	1985	999	100	Mr. Lassen rainbow	
			1989	2,500	250	Westslope cutthroat	
			1991	2,500	250	Westslope cutthroat	
			1993	2,500	250	Hayspur rainbow	

Appendix B. Odd-year stocking schedule for Panhandle Region mountain lakes.

Drainage/Lake	Code No.	Surface acres	No. stocked	Species	Substitute species
Kootenai					
Hidden	01-103	50	12,500	C2	K1
Lake Mtn.(Cutoff)	01-104	7	1,750	C2	None
West Fork	01-109	12	3,000	K1	C2
Long Mtn.	01-112	3	1,500	GR	None
Parker	01-113	3	1,000	GN	GR
Long Canyon (Smith)	01-115	6	3,000	GR	None
Myrtle	01-122	20	5,000	C2	None
Pyramid	01-125	11	2,750	K1	C2
Snow	01-134	10	2,500	C2	None
Roman Nose #3	01-137	12	3,000	K1	C2
Debt	01-157	5	1,250	C2	None
Spruce	01-154	5	1,250	K1	C2
Callahan	01-166	10	2,500	C2	None
Pend Oreille					
Hunt	02-101	12	3,000	C2	None
Standard	02-103	16	4,000	C2	None
Two Mouth #2	02-107	5	1,250	C2	None
Mollies	02-114	2	500	C2	None
Fault (Hunt Pk #1)	02-121	6	1,500	C2	None
McCormick (Hunt Pk #2)	02-122	3.1	775	C2	None
Beehive	02-128	7	1,750	C2	None
Harrison	02-129	29	7,250	C2	None
Dennick	02-171	8	2,000	C2	None
Sand	02-172	5	1,250	C2	None
Bloom	02-173	20	5,000	BK*Size 2	None
Caribou (near Keokee Mtn.)	02-196	6.8	1,700	C2	None

Appendix B. Continued.

Drainage/Lake	Code No.	Surface acres	No. stocked	Species	Substitute species
<u>Spokane</u>					
Gold	03-125	3	750	K1	None
Crater	03-133	5	2,500	GR	None
Bacon	03-144	9	2,250	C2	None
Forage	03-146	13	3,250	GN	GR
Halo	03-147	12	3,000	C2	None
Crystal	03-160	10	2,500	C2	None
<u>Little North Fork Clearwater</u>					
Mud	06-118	6	1,500	K1	None
Skyland	06-125	13	3,250	K1	None
Noseeum	06-130	4	1,000	C2	None
Steamboat	06-131	9	4,500	GR	None
Copper	06-201	3	750	C2	None
Silver	06-205	10	2,500	K1	None

Total number of fish to be stocked:
C2 - 59,975
K1 - 18,000
GR - 11,500
GN - 5,250 (Grayling can be substituted for golden trout)
BK - 5,000 Size 2

Appendix C. Even year stocking schedule for Panhandle Region mountain lakes.

Drainage/Lake	Code No.	Surface acres	No. stocked	Species	Substitute species
<u>Kootenai</u>					
Hidden	01-103	50	12,500	K1	C2
West Fork	01-109	12	3,000	C2	K1
Long Mtn.	01-112	3	1,500	C2	None
Parker	01-113	3	1,000	GN	GR
Long Canyon (Smith)	01-115	6	3,000	GR	None
Big Fisher	01-117	10	2,500	C2	None
Trout	01-124	7	1,750	K1	C2
Pyramid	01-125	11	2,750	C2	K1
Ball Creek	01-126	6	1,500	C2	None
Little Ball Cr.	01-127	4	1,000	C2	None
Roman Nose #3	01-137	12	3,000	C2	K1
Queen	01-148	5	1,250	C2	None
Spruce	01-154	5	1,250	C2	K1
Copper	01-155	5	1,250	C2	None
Estelle	01-167	5	1,250	BN	None
<u>Pend Oreille</u>					
Hunt	02-101	12	3,000	C2	None
Two Mouth #3	02-108	20	5,000	C2	None
Caribou (near West Fk. Mtn.)	02-116	7.8	1,750	C2	None
Little Harrison	02-126	6.5	1,625	C2	None
Harrison	02-129	29	7,250	C2	None
Beaver	02-130	5	1,250	BN	None
Dennick	02-171	8	2,000	C2	None
Sand	02-172	5	1,250	C2	None
Bloom	02-173	20	5,000.*	BK *Size 2	None
Moose	02-185	16.5	4,200	BN	None

Appendix C. Continued.

Drainage/Lake	Code No.	Surface acres	No. stocked	Species	Substitute species
<u>Pend Oreille</u>					
Caribou (near Keokee Mtn.)	02-196	6.8	1,700	C2	None
<u>Spokane</u>					
Crater	03-133	5	2,500	GR	None
Forage	03-146	13	3,250	GN	GR
<u>Little North Fork Clearwater</u>					
Devils Club	06-113	4	1,000	C2	None
Big Talk	06-114	?	2,500	C2	None
Larkins	06-117	12	3,000	C2	None
Hero	06-119	4	1,000	C2	None
Heart	06-122	40	10,000	K1	None
Northbound	06-123	12	3,000	C2	None
Fawn	06-126	13	3,250	C2	None
Noseeum	06-130	4	1,000	C2	None
Steamboat	06-131	9	4,500	GR	None
Gold	06-202	8	2,000	C2	None
Tin	06-204	3	750	K1	None

Total number of fish to be stocked:
C2 - 59,075
K1 - 25,000
GR - 11,500
GN - 4,250 (Grayling can be substituted for golden trout)
BK - 5,000 size 2
BN - 6,700

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